***

EXHIBIT 14

Basin Plan Amendment Work Plan

Westside Water Quality Coalition

Prepared for:

Westside Water Quality Coalition
21908 Seventh Standard Road
McKittrick, California 93251

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
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Date: September 19, 2016

Project FR1216043A

amec foster wheeler

September 19, 2016

Project FR1216043A

Greg Hammett
Westside Water Quality Coalition
21908 Seventh Standard Road
McKittrick, California 93720

Subject: **Basin Plan Amendment Work Plan**
Westside Water Quality Coalition

Dear Mr. Hammett:

The Westside Water Quality Coalition (WWQC) manages compliance with the Irrigated Lands Program in western Kern and Kings Counties on behalf of farmers. The Irrigated Lands Program is enforced by the California Regional Water Quality Control Board (RWQCB) by provisions of Waste Discharge Requirements, General Order R5-2013-0120 (Ag General Order). The Ag General Order includes provisions for an amendment to the Tulare Lake Basin Plan under certain circumstances.

First encountered groundwater (perched and unconfined) within areas of the WWQC includes high salinity that limits or prevents beneficial use. This work plan was prepared to summarize the content and process for a basin plan amendment of the Tulare Lake Basin, specifically to:

- Delist the beneficial use of municipal and domestic supply (MUN) in perched and unconfined/semi-confined groundwater in a portion of the of the WWQC area (Figure 1),
- Delist agricultural water supply (AGR) in perched groundwater in a portion of the WWQC area (Figure 1), and
- Modify AGR designations in unconfined/semi-confined groundwater in portions of the WWQC area to be consistent with the aquifers water quality (Figure 1).

The enclosed work plan is intended for WWQC's submittal to the RWQCB. Amec Foster Wheeler Environment & Infrastructure, Inc., is pleased to be of service to the WWQC. Please call if you have comments or questions pertaining to this work plan.

Sincerely yours,
Amec Foster Wheeler Environment & Infrastructure, Inc.

Gary L. Kramer, P. G.
Senior Associate Geologist

Timothy G. Souther
Principal Environmental Scientist

Enclosure: Basin Plan Amendment Work Plan

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Westside Water Quality Coalition

September 19, 2016
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This report was prepared by the staff of Amec Foster Wheeler Environment & Infrastructure, Inc., under the supervision of the Geologist whose seal and signature appear hereon.

The findings, recommendations, specifications, or professional opinions presented in this report were prepared in accordance with generally accepted professional geologic practice and within the scope of the project. No other warranty, express or implied, is provided.

PROFESSIONAL GEOLOGIST
Gary L. Kramer
No. 7308
STATE OF CALIFORNIA

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Senior Associate Geologist

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EXECUTIVE SUMMARY

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First encountered groundwater (perched and unconfined) within the WWQC includes areas of high salinity that limits or prevents beneficial use. This work plan was prepared to summarize the content and process for a basin plan amendment of the Tulare Lake Basin; specifically to:

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BASIN PLAN AMENDMENT WORK PLAN
Westside Water Quality Coalition

1.0 INTRODUCTION

The Westside Water Quality Coalition (WWQC) manages compliance with the Irrigated Lands Program in western Kern and Kings Counties on behalf of enrolled farmers. The Irrigated Lands Program is enforced by the California Regional Water Quality Control Board (RWQCB) by provisions of Waste Discharge Requirements, General Order R5-2013-0120 (Ag General Order)(RWQCB 2013). The Ag General Order includes provisions for an amendment to the Tulare Lake Basin Plan (Basin Plan, RWQCB, 1997) under certain circumstances. Provision VIII.M of the Ag General Order provides:

> In its Groundwater Quality Assessment Report, the third-party may identify high vulnerability areas that do not meet water quality objectives and where groundwater quality likely would not support a designated beneficial use even in the absence of the discharge of waste. In such cases, the third-party has the option of pursuing a basin plan amendment (or identifying an existing basin plan amendment process) to address the appropriateness of the beneficial use. Should the third-party pursue this option, the third-party shall submit a Basin Plan Amendment Workplan (BPAW) to the Central Valley Water Board within 120 days of the approval of the Groundwater Quality Assessment Report. The BPAW must include a demonstration that the groundwater proposed for de-designation meets any criteria set forth in the Basin Plan that the Board considers in making exceptions to beneficial use designations.

The WWQC previously submitted Groundwater Assessment Reports (GARs, Amec Foster Wheeler, 2015a and 2015b) for their jurisdiction to the RWQCB that identified areas where first-encountered groundwater does not meet water quality objectives for designated beneficial uses. These areas include perched groundwater within Belridge Water Storage District (BWSD), Dudley Ridge Water District (DRWD) and Lost Hills Water District (LHWD) (Figure 1) and unconfined/semi-confined groundwater in parts of BWSD, Berrenda Mesa Water District (BMWD), DRWD, and LHWD. Based on that information, the WWQC proposes this basin plan amendment work plan (BPAW). The areas of the proposed basin plan amendment (BPA) are shown in Figure 1. The resulting BPA will be coordinated through the Central Valley Salinity Coalition (CV-SALTS) for ultimate approval by the RWQCB.

2.0 METHODOLOGY

The Ag General Order also provides the following guidance on the content of a BPAW:

1. A technical justification for initiating the amendment process including maps of the areas proposed for BPA. The justification must include an assessment of naturally occurring (background) concentrations of the constituent(s); evaluate the potential for irrigated agriculture to further degrade groundwater quality beyond background in the identified areas; and provide a preliminary evaluation as to whether controllable water quality factors (as defined in the Basin Plan) are reasonably likely to result in attainment of the applicable use(s);

2. A use attainability study (UAA) plan to determine whether the beneficial use(s) proposed for de-designation may be attained through the application of current or anticipated technologies, whether groundwater within the proposed BPA area is currently being used for the beneficial use proposed for de-designation, and whether the groundwater proposed for de-designation meets any of the criteria set forth in the Basin Plan that the Board considers in making exceptions to beneficial use designations;

3. A description of how the third-party will coordinate the BPA process through CV-SALTS, if the amendment is based on elevated salt and/or nitrate concentrations;

4. A proposal for reduced reporting requirements for Members in the areas proposed for BPA. The third party may propose that trend monitoring be reduced in those areas. The third-party may also propose that the Management Practice Evaluation Program evaluate those areas be suspended. The reduced monitoring and reporting requirements shall be no less stringent than the requirements for low vulnerability areas;

5. A description of the monitoring and reporting required to complete the BPAW must be identified; and

1. A time schedule including work plan goals and milestones for completing BPAW items.

The following sections address each of the above elements of a BPAW.

3.0 TECHNICAL JUSTIFICATION

In the Basin Plan, BWSD, BMWD and LHWD are within the Kern County Basin Hydrologic Unit (DAU 259). DRWD is within the Tulare Lake Basin Hydrologic Unit (DAU 246). In the Basin Plan, the RWQCB designated beneficial uses for groundwater in these Hydrologic Units, as follows:

> Due to the "Sources of Drinking Water Policy," all ground waters are designated MUN (the use may be existing or potential) unless specifically exempted by the Regional Water Board and approved for exemption by the State Water Board. Ground water areas exempted from MUN are footnoted in Table II-2. In addition, unless otherwise designated by the Regional Water Board, all ground waters in the Region are

considered suitable or potentially suitable, at a minimum, for agricultural supply (AGR), industrial supply (IND), and industrial process supply (PRO).

TULARE LAKE BASIN

GROUNDWATER BENEFICIAL USES*

HYDROLOGIC UNIT	DAU	MUN	AGR	IND	PRO	REC-1	REC-2	WILD
Tulare Lake Basin	246	•	•	•				
Kern County Basin	259	•	•	•				

* Table II-2 presents the AGR, IND, PRO, REC-1, REC-2, and WILD beneficial uses of ground water that existed as of 1993.

Existing beneficial uses generally apply within the listed Detailed Analysis Unit (DAU). Due to the size of the DAUs, however, the listed beneficial uses may not exist throughout the DAU.

Also, in the Tulare Lake Basin Plan, the RWQCB summarized criteria to consider when granting exceptions to the designated beneficial uses:

> In considering any exceptions to the beneficial use designation of MUN, the Regional Water Board employs the following criteria:
>
> 1. The TDS must exceed 3,000 mg/L (5,000 µmhos/cm EC) and the aquifer cannot be reasonably expected to supply a public water system, or
> 2. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident) that cannot be reasonably treated for domestic use by using either Best Management Practices or best economically achievable treatment practices, or
> 3. The water source cannot provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day, or
> 4. The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, Section 146.4 for the purpose of underground injection of fluids associated with hydrocarbon or geothermal energy, provided these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.
>
> To be consistent with State Water Board Resolution 88-63 in making exceptions to beneficial uses other than municipal and domestic supply (MUN), the Regional Water Board will consider criteria for exceptions, parallel to Resolution 88-63 exception criteria, which would indicate limitations on those other beneficial uses as follows:
>
> 1. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident) that cannot be reasonably treated for domestic use

by using either Best Management Practices or best economically achievable treatment practices, or

2. The water source cannot provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day, or

3. The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 CFR, Section 146.4 for the purpose of underground injection of fluids associated with hydrocarbon or geothermal energy, provided these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.

Recently, the RWQCB has initiated consideration for de-designation of municipal and domestic supply (MUN) and agricultural water supply (AGR) for perched groundwater in the area of the Tulare Lake Bed based on the salinity of groundwater (RWQCB, 2016b). De-designation salinity criteria for MUN were taken from the Basin Plan provisions described above; 3,000 milligrams per liter (mg/L) Total Dissolved Solids (TDS) or 5,000 micromhos per centimeter (umhos/cm) electrical conductivity (EC). For AGR uses, de-designation salinity criteria were based on technical studies; 3,000 mg/L TDS and 5,000 umhos/cm EC.

4.0 HYDROGEOLOGY

The conceptual hydrogeologic model within the WWQC area is complex owing to the regional structure geology, overlapping depositional environments, and coeval structural deployment along with episodic periods of deposition and sub-aerial erosion along the west side of the San Joaquin Valley.

4.1 HYDROGEOLOGY IN THE BPAW STUDY AREA

Groundwater within the proposed BPAW occurs under perched, unconfined, semi-confined, and confined conditions (Amec Foster Wheeler, 2015a). Areas of shallow perched groundwater appear to correspond to the presence of a shallow clay layer (designated the A-clay) beneath portions of the WWQC. The perched aquifer consists of Pleistocene-Holocene fluvial and flood basin sediments comprised predominately of silts and clay interbedded with sand layers (Hilton et al., 1963; Croft, 1972). These sediments overlie the A-clay and grade laterally into younger alluvium to the west. The areal extent of perched aquifers appears centered on an axis along the Kern River Flood Channel between Goose Lake and Tulare Lake beds and lie east of the California Aqueduct (DWR, 2008). The lateral extents of the A-clay are poorly constrained. The A-clay reportedly has been encountered under LHWD at depths of 30 to 60 feet (P&P, 2007).

M. G. Croft (1972) identified a fine grained lacustrine or marsh deposit, which he designated the C-Clay, occurring at a depth of 100 feet near Buttonwillow Ridge, 50 feet beneath Semitropic Ridge and 220 to 300 feet beneath the Tulare lake bed. Croft did not extend the lateral extent of the C-Clay west toward Lost Hills due to a lack of geologic data. Amec Foster Wheeler Environment & Infrastructure, Inc.'s (Amec Foster Wheeler) review of recent boring log data collected in the Lost Hills area indicates that the C-Clay may be present west of Croft's original extent. The C-Clay is an aquitard and depending on its lateral extent in relation to the A-Clay and underlying regional aquifer above the E-Clay, groundwater encountered in the aquifer above the C-Clay may be present as perched, unconfined, or semi-confined/confined.

Unconfined aquifers exist in alluvial sediments of Antelope Valley east of the Lost Hills Anticline and below the perched groundwater in the upper Tulare Formation. The unconfined aquifer consists predominately of coarser alluvial sediments flanking the Temblor Range that grade laterally eastward into finer grained fluvial, marsh, deltaic, and lacustrine deposits between Goose Lake and Tulare Lake. In areas where fluvial deposits become highly interbedded and bifurcated, semi-confined groundwater conditions may be encountered in the upper Tulare Formation. The base of the unconfined aquifer is defined by the presence of the Corcoran Clay (Modified E-clay), where it is present. In areas where the Modified E-clay is absent, an unconfined to semi-confined aquifer extends to the top of the marine formations.

The modified E-clay described by R. W. Page (Page, 1986) forms the major regional aquitard that separates the upper unconfined aquifer from the lower confined aquifer in the southwestern San Joaquin Valley. Within BWSD and LHWD, it has been encountered in wells east of the California Aqueduct (Page, 1986). The E-clay is also known to underlie DRWD and portions of LHWD east of the Lost Hills Anticline, but appears absent west of this structure beneath the Antelope Plain (P&P, 2007) and BMWD. The presence of the E-clay beneath BWSD west of the California Aqueduct is poorly constrained. The depth at which the E-clay is encountered varies due to structural deformation associated with the presence of anticline and syncline structures along the west side of the valley. It is encountered as shallow as 100 feet along the east limb of Lost Hills (P&P, 2007) to as deep as 900 feet near the southwest edge of Tulare Lake bed (Page, 1986). The thickness of the E-clay ranges from 8 feet south of the town of Lost Hills to 205 feet near the southwest edge of the Tulare Lake bed (Page, 1986).

Groundwater below the E-clay is encountered in confined conditions. The Tulare Formation below the E-clay consists of unconsolidated interbedded sand, silt, and clay. The nature of these sediments ranges from coarser alluvial fan deposits near the Temblor Range to fine grained lacustrine, fluvial, and marsh deposits eastward toward the axis of the valley trough (Croft, 1972).

4.2 SOIL SALINITY

Groundwater quality in the BPAW study area is influenced by the natural salinity of native soils. A regional groundwater study conducted by the United States Geologic Survey in the 1950s (USGS, 1959) indicated high salinity groundwater in areas that predated agricultural development and irrigation. As described in the GAR, alluvial and Tulare Formation sediments within BWSD, BMWD, DRWD, and LHWD are derived from marine sediments of the coast range mountains (Amec Foster Wheeler, 2015a). These sediments contain elevated salinity based on soil surveys for Kern and Kings Counties (NRCS, 1986 and 2014). These sediments contribute salinity to perched and unconfined/semi-confined groundwater in the BPAW study area (Amec Foster Wheeler, 2015a).

4.3 MUNICIPAL WATER SUPPLY

Water for MUN is typically imported within the WWQC area due to the wide spread presence of high salinity groundwater. The State Water Resource Control Board's (SWRCB) Drinc database (https://drinc.ca.gov/dnn/) maintains Consumer Confidence Reports (CCRs) for regulated potable water systems in California. The following table summarizes the CCR's for water systems within or immediately adjacent to the WWQC areas:

Water System[1]	CCR[2]	Source[3]	EC[4] umhos/cm	TDS[5] mg/L	Cl[5] mg/L	SO4[5] mg/L
Aera Energy, LLC - Spicer City (Nonpotable)	2015	Groundwater	2,290-2,530	1,300-1,700	530-620	200-310
City of Avenal*	2015	Imported Surface Water	na	440	150	65
Buttonwillow County Water District*	2015	Groundwater	na	330-1,200	35-46	110-340
Clean Harbors**	2015	Imported Groundwater	650	380	100	110
Kettleman City Community Services District*	2015	Groundwater	1,300-1,600	780-830	190-360	130-230
Lost Hills Utility District	2015	Imported Groundwater	442-556	260-330	77-93	43-83
Wonderful Hulling & Shelling	2015	Imported Surface Water	550	350	110	38
Wonderful Pistachio & Almonds - Hwy 33 Facility	2015	Imported Surface Water	342	230	62	19
Wonderful Pistachio & Almonds - King Facility	2015	Imported Surface Water	376	230	73	19

SMCLs[6]	900-1600	500-1000	250-500	250-500

1. Water systems identified by the SWRCB: https://drinc.ca.gov/dnn/
   * = water systems located within 1 outside WWQC.
2. Date of Consumer Confidence Report from which data is summarized.
   ** = analytical results from supplier of imported groundwater; Interstate 5 Properties
3. Source of water for the water system.
4. Electrical Conductance in micromhos per centimeter.
5. Chemical constituents in milligrams per liter; TDS = total dissolved solids, Cl = chloride and SO4 = sulfate.
6. Range of Secondary Maximum Contaminant Levels in milligrams per liter from Section 64449, Title 22, CCR.
   Constituents exceeding a Recommended SMCL are highlighted.

The above data shows that imported surface water and imported groundwater meet the recommended Secondary Maximum Contaminant Levels (SMCLs) for salinity constituents. However, locally sourced groundwater within the WWQC does not meet recommended SMCLs for two or more constituents.

Based on our initial review of domestic well water uses, we could only identify two water systems that used groundwater for limited MUN:

- BMWD identified one well (23S/20E-17) that produces water for domestic supply at the far western extent of BMWD. An expensive point-of-use (under-sink) water treatment system (ion exchange plus reverse osmosis [RO]) is used to treat drinking water for one residence.
- DRWD has identified one well (23S/20E-17) that is used for water supply in toilets and sinks (bottled water is used for drinking water).

The BPA will update the above information with data from the well inventories (well construction records [WCRs]) maintained by the California Department of Water Resources and drinking water systems database (www.drinc.ca.gov) maintained by the SWRCB.

4.4 OIL FIELD WATER QUALITY AND USE

Crude Oil production occurs in several areas of the WWQC. Oil fields located in the coalition area include the Antelope Hills, Antelope Hills North, Beer Nose, Belridge North, Belridge South, Blackwells Corner, Cal Canal, Chico Martinez, Cymric, Devils Den, Dudley Ridge, Kettleman Middle Dome, Lost Hills, Lost Hills Northwest, McDonald Anticline, Monument Junction, and Welcome Valley fields (Figure 2). Crude oil production from reservoirs in Tulare Formation has historically occurred in some of these fields. Only four of these fields were reported to have any "fresh water" as defined by California Department of Water Resources (DOGGR) (<3,000 mg/L TDS, DOGGR, 1998); Blackwells Corner, Cal Canal, Devils Den (fresh water in north area only) and Dudley Ridge.

Produced waste water associated with crude oil production has been historically disposed of in unlined surface impoundments and also in underground injection wells which are regulated under the underground injection control (UIC) program (40CFR146). Production of oil and gas and disposal of produced water and sour gas from these fields contained in DOGGR (DOGGR, 2016) reports for the period from February 2015 through May 2016 are summarized in Table 1. The BPA will identify the areas and depths of perched or unconfined/semi-confined groundwater; oil and gas producing zone within the Tulare Formation, and any produced water disposal operations within the Tulare Formation within WWQC BPAW study area. The BPA will include recent groundwater quality data collected by oil field operators that was not available for presentation in the GAR. These data include: 1) groundwater monitoring data required under SWRCB Resolution No. 2015-0047 for well stimulation treatments (commonly referred as SB4 regulations), and 2) Groundwater analytical data required under California Water Code Section 13267 orders issued by the RWQCB to operators for UIC wells injecting into aquifers classified as potential underground sources of drinking water (USDW) (40CFR146) will be presented in the BPA.

The oilfield operators use local groundwater for industrial supply (IND) uses, including water flood operations for oilfield reservoir re-pressurization; enhanced oil recovery (EOR) operations such as steam flood and cyclic steam operations; surface construction; oil well installation and well maintenance work over operations; and localized dust control (County, 2015). With the exception of steam flood and cyclic steam EOR operations, these IND uses of water are not dependent upon the quality of the water. Some oil field operators utilize imported groundwater or imported surface water for EOR operations; the imported water is specifically treated for that use. These IND uses of groundwater will be described in more detail in the BPA.

4.5 Preliminary Conceptual Hydrogeologic Model for the BPAW Study Area

The following sections present a generalize summary of the conceptual hydrogeologic model that will support the BPA. The final conceptual hydrogeologic model will present a three dimensional model of the hydrogeology within the BPAW study area. At a localized level the preliminary conceptual model of groundwater hydrology is represented by a cluster of wells located near the Kern National Wildlife Refuge in 25S/21E-1.

In 1990, a well cluster (25S/21E-1N) was installed in the northeast corner of LHWD, just west of the Kern Wildlife Refuge, and sampled by United States Geological Survey ([USGS] USGS, 1994). The perched zone well of this cluster (1N20) was 20 feet in depth and was screened above what appears to be the A-clay (23.5 to 28 feet in depth). Perched groundwater from this well contained relatively low salinity (1,270 mg/L TDS and 1,750 umhos/cm EC); due to

Refuge's infiltration of imported good quality water from Poso Creek and the California Aqueduct. Further west of the Refuge, salinity in perched groundwater increases substantially; 13,900 mg/L TDS (16,700 umhos/cm EC) at about 1 mile west of the Refuge (well 25S/21E-12D2) and 91,900 mg/L TDS (102,000 umhos/cm EC) at about 6 miles west of the Refuge (well 25S/21E-7B3).

The deepest well (1N200) in USGS's cluster was installed below what appears to be the C-Clay (120 to 162 feet in depth) with a perforations between 189 and 199 feet in depth. Deep well groundwater contained somewhat higher salinity (2,620 mg/L TDS and 4,540 umhos/cm EC) than the perched groundwater from well 1N20. Intermediate wells (1N50 and 1N100) were installed below the A-Clay and above the C-Clay with the following screened intervals; 52 to 62 feet in depth and 90 to 100 feet in depth, respectively. Intermediate well groundwater contained the highest salinity of the clustered wells. Well 1N50 had a measured TDS of 9,280 mg/L (12,000 umhos/cm EC)and well 1N100 had a measured TDS of 4,260 mg/L (6,250 umhos/cm EC), respectively. Based on these data, the intermediate zone groundwater is isolated by the A-Clay and C-Clay aquitards. The intermediate aquifer zone is more representative of background groundwater quality, as it did not benefit locally from higher quality recharge from the Refuge water supply into perched groundwater zone above the A-Clay.

In 1992 and near the approximate location of well cluster 25S/21E-1N, LHWD installed an irrigation test well into the confined groundwater below the E-Clay (Corcoran clay) (BWSD, 2016). The well (1N680) was constructed below the E-Clay (508 to 630 feet in depth, based on a geophysical log) with a screened interval between 630 and 900 feet in depth. The initial water level in this well was at 185 feet in depth and it produced water at about 1,552 gallons per minute. The initial well groundwater samples on November 11, 1992, contained relatively low salinity of 620 umhos/cm EC (about 434 mg/L TDS calculated from EC). In 2009, LHWD conducted a second pump test for 25S/21E-1N after the depth to water was measured at about 155 feet. LHWD was able to produce about 1,500 gallons per minute and a well water sample collected on October 15, 2015, also contained relatively low TDS of250 mg/L (477 umhos/cm EC).

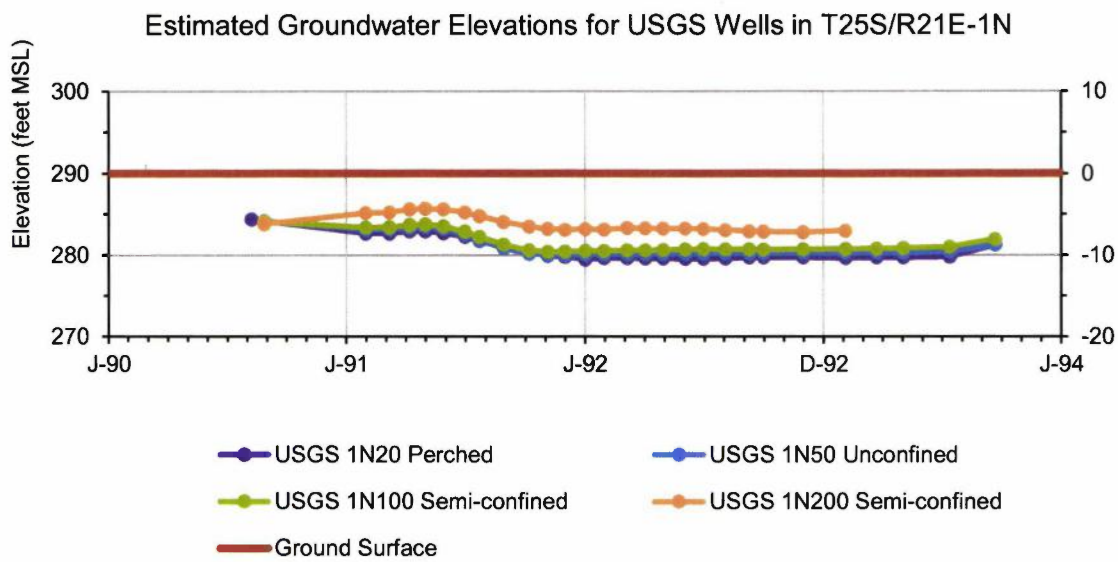
Based on these data, the depth and quality of groundwater within the area of well cluster 25S/21E-1 can be summarized as follows:

Groundwater[1]	Depth (feet)	TDS (mg/L)	EC (umhos/cm)
Perched	Above 23.5	1,270 to 91,900	1,750 to 102,000
Unconfined/Semi-confined	52 to 508	2,260 to 9,280	4,540 to 16,500

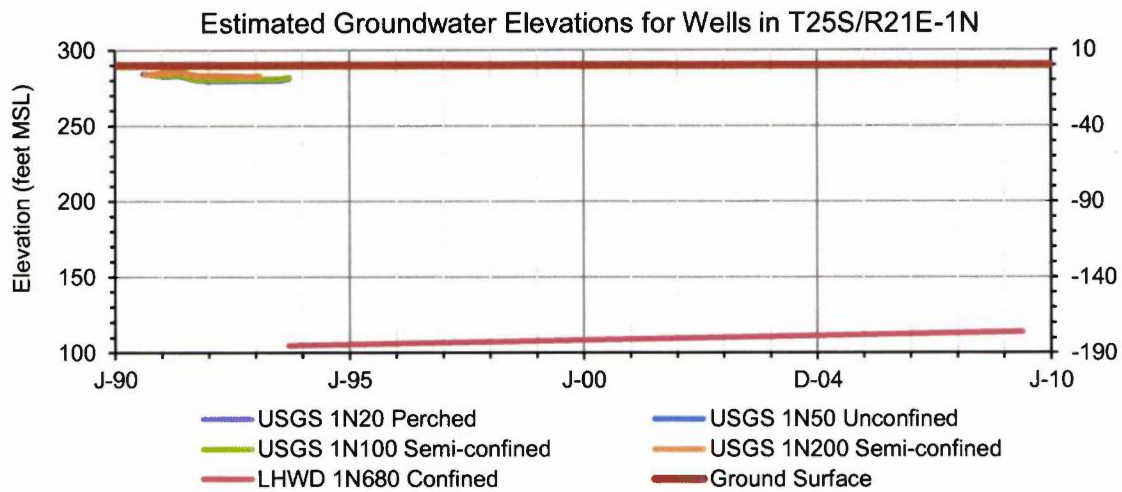
Confined	Below 630	250 to 434	477 to 620

1. Adapted from USGS, 1994 and BWSD, 2016 (see text).

The following chart summarizes the available groundwater depths and elevations for the wells in 25S/21E-1N. Since well heads were not surveyed, we used the ground surface elevation determined by USGS (290 feet above mean sea level [MSL] in 25S/21E-1N) to calculate estimated groundwater elevations.



Groundwater elevations of the four USGS wells were consistently similar in elevation from 1990 through 1993, except that elevations of water the deepest well (1N200) were slightly higher than elevations in the shallower wells. However, the groundwater elevation of the deeper LHWD well is more than 150 feet lower in 1993 and 2009, as depicted in the following chart.



Considering the difference in elevation of the groundwater surface in the confined groundwater well (1N680 at 176 to 185 feet in depth) and water encountered in the USGS's perched groundwater well (1N20) and unconfined/semi-confined groundwater wells (1N50, 1N100, and 1N200), there has been a downward vertical gradient across the E-Clay. As part of the BPA work, Amec Foster Wheeler will summarize well permitting requirements of the Kern and Kings county health departments, as to sealing of wells completed through the E-Clay.

A review of oil field geophysical logs indicates that there are areas along the northeastern flanks of Lost Hills where vadose zone sands are encountered below groundwater perched above the C-Clay. These areas need further delineation because they are important indicators of groundwater isolation by perching aquitards such as those present in some areas above the A-Clay and C-Clay. The WWQC is collaborating with the USGS on a groundwater quality study in the Lost Hills area using electromagnetic remote sensing techniques. Once these data become available they will be incorporated into the conceptual hydrogeological model.

Based on available groundwater data, the perched groundwater extends to the area shown in Figures 1 and 3. The lateral extent of the modified E-Clay was most recently delineated by the USGS (USGS, 2009) for use in their San Joaquin Valley Hyrologic Model (SJVHM) and showed that this confining layer extended from the valley floor, under the eastern border of the WWQC area, to the base of the Lost Hills and Kettleman Hills anticlines on the west. Further west in Antelope Plain, neither the perched groundwater nor the confined groundwater are known to exist. As part of the BPA work, Amec Foster Wheeler will obtain WCRs from the Department of Water Resources (DWR) for groundwater wells within the areas proposed for BPA and will construct an updated three-dimensional hydrogeologic model depicting the extents of the A-Clay, C-Clay, and E-Clay beds. The resulting hydrogeologic model will be used to characterize the dimensions (area, thickness, and depths) of aquifers designated for the BPA.

5.0 SUMMARY OF PROPOSED BASIN PLAN AMENDMENTS

The following sections discuss proposed BPAs within portions of the WWQC area.

5.1 PERCHED GROUNDWATER

The perched groundwater within eastern BWSD, southern DRWD, and eastern LHWD was originally characterized by the USGS for shallow groundwater sampling in 1989 (USGS, 1993) (Figure 3). The 25 perched zone wells were 12.6 to 23.7 feet in depth and, between May and August 1989, the depth to perched groundwater was 2.8 to 16.14 feet below ground surface. USGS sampled the 25 perched zone wells for inorganic constituent analysis; the results are summarized in Table 2 (see Figure 2 for location). This data shows that the perched groundwater varied widely in salinity, but averaged 14,840 mg/L TDS and 19,064 umhos/cm of EC. Analytical results are compared to published water quality criteria for MUN and AGR (AGR-Irrigation, AGR-Livestock and AGR-Poultry); constituent concentrations greater than the water quality criteria for MUN are highlighted.

The perched groundwater within eastern BWSD, southern DRWD, and eastern LHWD is more recently characterized by the DWR for monitoring conducted in 2012 (Figure 3). DWR regularly sampled shallow groundwater in the area from five tile drains in the area; Table 3 summarizes the most recent analytical data for each drain. The salinity of that perched groundwater varied widely, but averaged 13,250 mg/L TDS and 16,700 umhos/cm of EC. Analytical results are compared to water quality criteria for MUN and AGR (AGR-Irrigation, AGR-Livestock and AGR-Poultry); constituent concentrations greater than the water quality criteria for MUN are highlighted. The perched groundwater also exceeds water quality criteria for other constituents such as boron and sulfate.

Based on that high salinity and other constituents, perched groundwater (about 2.8 to 23.7 feet below ground surface) and above the A-Clay (about 23.5 to 28 feet below ground surface) does not currently serve as a source for MUN or AGR and is unlikely to serve as a source for MUN or AGR in the future without expensive desalination treatment. The perched groundwater within eastern BWSD, southern DRWD, and eastern LHWD meets the conditions for de-designation of MUN and AGR, with the possible exception of future use for MUN or AGR after expensive desalination treatment. The feasibility of treating this perched groundwater for MUN or AGR will be addressed in the UAA.

5.2 UNCONFINED TO SEMI-CONFINED GROUNDWATER

Beyond the perched groundwater, unconfined to semi-confined groundwater occurs in western BWSD, BMWD, western DRWD, and western LHWD (Figure 1).

Unconfined and semi-confined groundwater in this area was first characterized by USGS in 1959 (USGS, 1959). USGS described the Antelope Plain area:

> This area is characterized by low rainfall, ground water of inferior quality, no imported surface-water supplies, and high concentrations of salts in the soil and subsoil. Accordingly, there has been little agricultural development in this vast area. For the most part the land is used only for grazing, and that only during the winter and spring. Records are available on the industrial wells drilled to supply water to widely scattered oil-pumping stations; otherwise, the few wells in the area are mostly stock wells drilled many years ago for which little or no information is available.

USGS summarized the analytical results of 42 water supply wells within the WWCA area; the wells (locations shown in Figures 4 through 6) were sampled between 1930 and 1957 and analyzed for inorganic chemicals (results summarized in Table 4). Analytical results are compared to water quality criteria for MUN and AGR (AGR-Irrigation, AGR-Livestock and AGR-Poultry); constituent concentrations greater than the water quality criteria for MUN are highlighted. The analytical results indicate that unconfined/semi-confined groundwater typically exceeded drinking water quality criteria for salinity (TDS, EC, sulfate, and boron) and would require desalination treatment for MUN. The average TDS, sulfate were 2,760 mg/L and 1,198 mg/L, respectively, compared to the corresponding drinking water quality criteria of 1,000 mg/L and 500 mg/L, respectively. These average concentrations also exceeded the water quality criteria for AGR-Irrigation of 2,000 mg/L TDS. However, the average concentrations did not exceed the water quality criteria for AGR-Livestock and AGR-Poultry and could be suitable for those uses.

Since the time of the USGS report, the California Aqueduct has imported water into the BWSD, BMWD, DRWD, and LHWD for agricultural water supply. Also, Lost Hills Utility District and BMWD have imported groundwater from 10 miles to the east of the WWQC area for MUN. Based on these available water supplies, scattered agricultural development and associated agribusiness has developed from I-5 on the east up into Blackwells Corner in western BMWD.

Groundwater was most recently characterized in 2013 (Amec Foster Wheeler, 2015a). Amec Foster Wheeler sampled 27 production wells (Figures 4 through 6) and arranged for inorganic chemical analysis (Tables 5 and 6). Analytical results are compared to water quality criteria for MUN and AGR (AGR-Irrigation, AGR-Livestock, and AGR-Poultry); constituent concentrations greater than the water quality criteria for MUN are highlighted. This unconfined/semi-confined groundwater contains less salinity than the perched groundwater described above, but typically exceeds the drinking water standards for TDS and for sulfate and boron in certain areas (see Tables 5 and 6; Figures 4 through 6). Unconfined/semi-confined groundwater contains elevated concentrations of these constituents based primarily on natural processes (contact with marine sediments). The average TDS, sulfate, and boron concentrations (4,230 mg/L, 990 mg/L, and 9.5 mg/L) exceed the corresponding drinking water quality criteria (1,000 mg/L, 500, mg/L, and 5 mg/L, respectively). Due to these water quality conditions, the unconfined/semi-confined groundwater in western BWSD, BMWD, western DRWD, and western LHWD is not known to serve as a source for MUN, except for one residence in far western BMWD that treats groundwater by reverse osmosis for domestic supply. However, the unconfined/semi-confined groundwater does occasionally serve as a source for irrigation make up water in dry years (blended with imported high quality water) or for limited stock watering.

Based on these conditions, unconfined/semi-confined groundwater within western BWSD, BMWD, and western DRWD, western LHWD meets criteria for de-designation of MUN and unlimited AGR, with the possible exception of future use for MUN or AGR after expensive desalination treatment. The feasibility of treating this unconfined/semi-confined groundwater for MUN or AGR will be addressed in the UAA. WWQC proposes to de-designate MUN for unconfined/semi-confined groundwater within the area shown in Figure 1 and to change designation to limited AGR uses based on salinity to the classification recently suggested by CV-Salts (2016):

- AGR Class 1: TDS ≤ 640 mg/L (EC ≤ 1,000 microSiemens per centimeter [μS/cm]),
- AGR Class 2: 640 mg/L < TDS ≤ 2,000 mg/L (1,000 μS/cm < EC ≤ 3,000 μS/cm),
- AGR Class 3: 2,000 mg/L < TDS ≤ 5,000 mg/L (3,000 μS/cm < EC ≤ 7,500 μS/cm), and
- AGR Class 4: TDS > 5,000 mg/L (EC > 7,500 μS/cm).

The actual AGR classification will be coordinated with CV-SALTS to be consistent with their salt and nutrient management plan. The feasibility of treating this unconfined/semi-confined groundwater for MUN or AGR will be addressed in the UAA.

5.3 CONFINED GROUNDWATER

As described above, confined groundwater in northeastern LHWD is of good mineral quality; 250 to 434 mg/L TDS and 477 to 620 umhos/cm EC. WWQC acknowledges the good mineral quality of groundwater below the E-Clay and does not propose modification of the current designation for confined groundwater (MUN, AGR, and IND, RWQCB, 1997).

6.0 USE ATTAINABILITY STUDY

Pursuant to the Ag General Order…"A use attainability study plan to determine whether the beneficial use(s) proposed for de-designation may be attained through the application of current or anticipated technologies…" The proposed UAA will evaluate the technical and economic feasibility of attaining future uses of MUN or AGR that might be supported by:

- Injection of fresh water into the perched or unconfined/semi-confined groundwater,
- Groundwater recharge of fresh water into the perched or unconfined/semi-confined groundwater, and
- Treatment of the perched or unconfined/semi-confined groundwater.

The technical feasibility will address whether water quality suitable for unrestricted MUN or AGR can be attained by currently available technologies.

Aquifer storage and recovery (ASR) is the injection or percolation of high quality water into an aquifer for future extraction and use as MUN or AGR. In areas of saline soils and saline groundwater, these methods have obvious limitations. The UAA will evaluate the technical feasibility of meeting water quality criteria for MUN and AGR as well as the economic feasibility of these ASR methods.

Treatment of groundwater for salinity (desalination) can currently be accomplished by distillation, reverse osmosis, and electrodialysis reversal. These methods can achieve water quality criteria for MUN or AGR, but are very expensive and include the necessity of disposal/reuse of concentrated brine or sludge. Desalination will be evaluated for a municipal scale system (Lost Hills Utility District), a single residence and a small (640 acre) farming operation. The UAA will evaluate the technical and economic feasibility of an emerging desalination process; solar distillation. The UAA will also evaluate the technical and economic feasibility of desalination treatment of perched and unconfined/semi-confined groundwater for future MUN and AGR.

7.0 CV-SALTS COORDINATION

WWQC has conducted an initial meeting with Mr. Daniel Cozad, Executive Director of CV-SALTS to discuss coordination related to the BPA. CV-SALTS proposes to provide the following support for the BPA:

- CV-SALTS Technical Committee will review and comment on the BPAW for consistency with the salt and nitrogen management plan being currently considered,

- CV-SALTS Technical Committee will review and comment on additional groundwater quality data developed to support the BPA, and

- CV-SALTS Technical Committee will review and comment on the draft BPA report for consistency with the salt and nitrogen management plan and other BPAW for consistency with the salt and nitrogen management plan being currently considered,

- Public meeting to consider preliminary approval of the BPA.

WWQC has agreed in concept with CV-SALTS proposal, depending upon the results of the concurrent BPA for delisting MUN in Tulare Lake Bed and the salt and nitrogen management plan.

8.0 GROUNDWATER MONITORING

Separately, the WWQC is preparing a Groundwater Quality Trend Monitoring Program (TMP) for all of the WWQC area including supplemental areas (Kettleman Plain, Sunflower Valley, and Western Supplemental Area) that are not part of the areas proposed for the BPA. The TMP will address the RWQCB comments related to the GAR including;

- Designation of high vulnerability areas based on nitrate concentrations in groundwater,
- Summarize well construction information for monitoring wells and for other area wells,
- Evaluation of preferential pathways for vertical migration in wells,
- Evaluate identified references for relevant data,
- Evaluate the list of potential domestic well sites,
- Evaluate groundwater recharge within the WWQC,
- Evaluate existing groundwater monitoring efforts for inclusion in TMP, and
- Evaluate depth to groundwater based on available data.

In addition to the above items, the TMP will map service areas for MUN and AGR water suppliers in the area. The TMP will propose groundwater sampling and analysis from shallow wells or drains in areas of the WWQC in which agricultural irrigation is currently conducted. The TMP will include well construction information for monitored wells, a sampling schedule, a sampling and analysis plan, description of water quality trend analysis methods, and annual or 5-year reporting.

The TMP will also propose one round of groundwater sampling and analysis for shallow wells in areas proposed for the BPA that are not in immediate proximity to irrigated agriculture. These data will be used for further characterization of perched and unconfined/semi-confined groundwater for purposes of supporting the BPA.

With the resulting BPA, the WWQC anticipates proposing to limit groundwater monitoring within the proposed exempted areas to the 5-year monitoring schedule of low vulnerability areas, as described in the Ag General Order. Also per provisions in the Ag General Order, the WWQC also proposes that the requirement for a Management Practice Evaluation Program (MPEP) for those BPA areas (Figures 1 and 2) be suspended. The WWQC proposes to limit groundwater monitoring frequency and suspend the MPEP, pending completion of the BPA.

9.0 TIME SCHEDULE

The BPA process is anticipated to include coordination with staff of CV-SALTS and coordination with staff of the RWQCB. The BPA process is anticipated to proceed in accordance with the following preliminary schedule:

Tasks	Completion
Coordination with CV-SALTS	
1. CV-Salts Review BPAW	January 2017
2. CV-Salts Review Groundwater Monitoring Data	June 2018
3. WWQC Submits Draft BPA and UAA	May 2019
4. CV-Salts Review Draft BPA and UAA	August 2019
5. CV-Salts Review Revised Draft BPA and UAA	January 2019
Coordination with RWQCB/SWRCB	
1. RWQCB Review BPAW	January 2017
2. WWQC Submit TMP Work Plan	May 2017
3. RWQCB Review TMP Work Plan	August 2017
4. WWQC Submit TMP for 2017	May 2018
5. RWQCB Review TMP for 2017	August 2017
6. WWQC Submit Draft BPA and UAA	May 2019
7. RWQCB Conduct California Environmental Quality Act Scoping Meeting	July 2019
8. RWQCB Prepare Draft Substitute Environmental Document	May 2020
9. RWQCB Public Notice	August 2020
10. RWQCB Hearing	October 2020
11. RWQCB Adoption	December 2020
12. SWRCB Public Notice	January 2021

13. SWRCB Hearing — March 2021
14. SWRCB Adoption — July 2021

Review/Concurrence by Office of Administrative Law December 2021

This preliminary schedule is based on the timely cooperation of CV-SALTS, RWQCB, SWRCB, and others. It also assumes that BPA approval can be supported by a substitute environmental document, instead of an environmental impact report. Since the schedule does not include any extra time for delays, it is very likely that the process will require additional time.

10.0 BASIN PLAN AMENDMENT

Ultimately, the resulting BPA documentation to be submitted to the RWQCB for approval is anticipated to include:

- Draft resolution with proposed text changes for the Tulare Lake Basin Plan to implement the BPA and approve the substitute environmental document,
- A technical report summarizing the results of the above work, including the technical justification for the amendment, a map of the amendment areas and the UAA results, and
- A substitute environmental document and associated comments from interested parties.

11.0 REFERENCES

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TABLE 1

FRESH WATER, PRODUCTION AND INJECTION INFORMATION; OIL FIELDS

Basin Plan Amendment Workplan
Westside Water Quality Coalition

Oil Field	Depth to Fresh Water[1] (feet)	2015-2016 Production[2] Oil (barrels)	2015-2016 Production[2] Gas (million cubic feet)	2015-2016 Injection[2] Water/Steam (barrels)	2015-2016 Injection[2] Gas/Air (million cubic feet)
Antelope Hills	none	4,628,479	923,555	8,016	913,794
Antelope Hills, North	none	6,045,693	828,773	28,943,408	0
Beer Nose	none	368,776	354,805	0	0
Belridge, North	none	92,405,192	261,316,306	563,482,961	26,236,781
Belridge, South	none	1,495,455,423	586,507,947	8,029,453,760	8,334,828
Blackwells Corner	600	454,430	139	2,867,217	0
Cal Canal	800	2,771,127	9,747,212	4,553,860	0
Chico Martinez	none	925,053	124	6,500,842	552
Cymric	none	476,159,993	93,093,401	1,499,585,904	28,383,147
Devils Den	300 (northern part only)	1,169,016	663,987	273,241	0
Dudley Ridge (abandoned)	450	0	0	0	0
Lost Hills	none	349,048,622	565,679,923	2,526,137,296	17,191,541
Lost Hills, Northwest	none	588,494	745,417	3,302,212	0
McDonald Anticline	none	6,305,414	5,458,381	43,082,773	73,379
Monument Junction	none	4,731,622	13,485,408	4,781	0
Shale Flats (abandoned)	none	0	0	0	0
Shale Point	none	52	324,676	0	0
Welcome Valley	none	7,924	0	0	0

1. Total dissolved solids <3,000 mg/L; California Oil and Gas Fields, DOGGR, 1998.
2. February 2015 through May 2016 production/injection; https://secure.conservation.ca.gov/WellSearch

TABLE 2

PERCHED GROUNDWATER ANALYTICAL RESULTS FOR MINERAL/METAL CONSTITUENTS-1989

Basin Plan Amendment Work Plan
Westside Water Quality Coalition

Well	Depth of Well (feet)	Date	Depth to Water (feet)	EC (umhos/cm)	TDS (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	NO_3-N (mg/L)	SO4 (mg/L)
25S/20E-15A1M	23.7	7/12/1989	2.8	3,140	2,840	460	80	82	230	67	1537	1.4	1,900
25S/20E-23P1M	15.4	6/21/1989	4.1	3,810	3,370	470	84	4.6	400	97	229	17	2,100
25S/21E-7B3M	23.1	5/9/1989	8.85	102,000	91,900	800	1,400	14	30,000	44,000	185	95	15,000
25S/21E-12D2M	18.5	7/7/1989	6.49	16,700	13,900	160	280	1.7	4,100	1,600	849	12	7,200
25S/21E-17H1M	17.1	6/21/1989	8.15	36,200	25,700	900	770	9.3	7,200	11,000	349	0.3	5,500
25S/21E-26P2M	18.4	6/21/1989	6.34	43,900	44,000	68	200	3.3	13,000	3,400	880	36	27,000
25S/21E-29N1M	15	6/21/1989	3.49	16,500	15,100	420	45	5.4	4,200	640	154	15	9,500
25S/21E-31P1M	16.68	6/21/1989	6.53	27,200	19,000	1,000	340	1.4	5,200	8,200	160	5.5	4,000
25S/21E-33N1M	18.8	6/21/1989	6.01	14,600	12,400	430	78	1.6	3,500	1,500	295	3	6,700
25S/22E-19N1M	20	7/12/1989	6.52	1,840	1,100	89	37	1.4	220	310	189	<0.1	310
25S/22E-34A2M	18	6/20/1989	14.7	32,400	27,400	220	300	1.9	8,500	6,300	805	2.3	12,000
26S/21E-2R1M	17.5	6/21/1989	13.12	3,170	1,950	37	17	1.4	630	340	354	0.33	740
26S/21E14R1M	17.8	6/29/1989	3.53	23,100	27,100	330	180	3.9	5,900	1,000	295	14	14,000
26S/21E-16R1M	23.5	7/11/1989	16.14	14,900	10,400	980	240	0.9	2,100	3,700	151	185	2,400
26S/21E-36Q1M	19	6/20/1989	11.11	7,110	6,210	390	99	2.2	1,300	59	234	<0.1	4,200
26S/22E-28R2M	22	6/20/1989	12.5	5,910	3,770	210	42	0.4	1,000	1,200	239	29	1,000
26S/22E-34P1M	17.9	6/20/1989	6	14,500	9,740	570	68	4.2	2,700	3,900	293	9.4	2,200
27S/22E-4E2M	14.3	6/21/1989	3.18	9,840	6,230	30	82	1.2	2,000	2,200	538	46	1,400
27S/22E-15A2M	18.7	7/11/1989	5.48	8,100	5,500	6	7	0.5	1,900	1,000	815	19	2,100
27S/22E-17R3M	15.92	6/22/1989	4.4	34,200	2,240	63	29	2.1	670	370	490	2.1	820
27S/22E-18D1M	18	6/32/89	14.12	29,800	22,300	460	290	6.7	7,000	8,400	379	0.78	5,800
27S/22E-20M1M	20.6	7/12/1989	3.3	10,400	7,870	260	120	2.5	2,100	1,200	68	2.2	4,100
27S/22E-23D4M	20.8	7/11/1989	5.81	9,910	6,640	270	200	2	1,600	2,200	371	5.8	2,100
28S/22E-5A1M	12.6	6/22/1989	4.73	2,170	1,340	140	12	5.8	300	350	180	<0.1	410
28S/22E-15N6M	21	7/12/1989	7.4	5,210	3,010	310	85	0.9	670	1,100	449	3.4	560
MUN				*1,600*	*1,000*	--	--	--	*20*	*500*	--	*10*	*500*
AGR-Irrigation				*3,000*	*2,000*	--	*500*	--	--	--	--	--	--
AGR-Livestock				*8,000*	*5,000*	--	*500*	--	--	--	--	*100*	*3,000*
AGR-Poultry				*5,000*	--	--	*500*	--	--	--	--	*100*	--

1. MUN - Municipal Supply, AGR - Agricultural Supply, µmhos/cm - micromhos per centimeter, mg/L - milligrams per liter, and meq/L - milliequivalents per liter, -- - not available or not applicable. Constituent concentration in mg/L milligrams per liter. TDS - total dissolved solids, Ca - calcium, Mg - magnesium, K - potassium, Na - sodium, Cl - chloride, HCO_3 - bicarbonate, NO_3-N - nitrate nitrogen, and SO4 - sulfate, EC - electrical conductance in µmhos/cm - micromhos per centimeter.
2. Tile drain designation is by California well numbering system. Drain locations shown on Figure X.
3. MUN is MCL - maximum contaminant level or SCML - secondary maximum contaminant level. For Na - Sodium, the EPA Drinking Water Health Advisory (DWHA) of 20 mg/L was listed for MUN. AGR-Irrigation, AGR-Livestock and AGR-Poultry are from *Water Quality for Agriculture*. Concentrations at or greater than the MUN criterion (MCL/SMCL/DWHA) are highlighted.

TABLE 3

RECENT PERCHED GROUNDWATER ANALYTICAL RESULTS FOR MINERAL/METAL CONSTITUENTS

Basin Plan Amendment Work Plan
Westside Water Quality Coalition

Tile Drain	Date	EC (µS/cm)	TDS (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Cl (mg/L)	NO3-N (mg/L)	SO4 (mg/L)	Hardness (mg/L)	pH (s.u.)
LNW4457	7/30/86	14,000	11,000	615	132	2.1	2,920	2,710	38	4,030	2,080	8
LNW5454	7/13/04	12,200	9,420	570	115	<10	2,380	1,960	73.5	4,200	1,897	7.8
LNW6459	3/18/08	27,180	21,380	531	323	7.7	6,120	7,060	226	5,370	2,656	7.8
LNW5467	2/13/12	14,950	12,520	489	207	4	3,350	1,850	255	5,710	2,074	7.7
LNW6467	2/13/12	27,940	22,560	692	538	7	6,020	7,570	290	6,440	3,944	7.8
STC6467	7/11/90	3,860	2,600	208	18	5.2	625	615	0.27	782	594	7.5
MUN		*1,600*	*1,000*	--	--	--	*20*	*500*	*10*	*500*	--	--
AGR-Irrigation		*3,000*	*2,000*	--	*500*	--	--	--	--	--	--	--
AGR-Livestock		*8,000*	*5,000*	--	*500*	--	--	--	*100*	*3,000*	--	--
AGR-Poultry		*5,000*	--	--	*500*	--	--	--	*100*	--	--	--

Tile Drain	Date	As (mg/L)	Ba (mg/L)	B (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mo (mg/L)	Se (mg/L)	Zn (mg/L)
LNW4457	7/30/86	<0.001	na	21	<0.001	<0.001	0.01	<0.001	na	0.13	0.01
LNW5454	7/13/04	0.012	<0.5	19.4	na	na	na	na	0.519	0.07	na
LNW6459	3/18/08	0.027	<1	28.7	na	na	na	na	0.62	0.25	na
LNW5467	2/13/12	0.02	<0.5	26.5	na	na	na	na	1.16	0.305	na
LNW6467	2/13/12	0.054	<0.1	42.6	na	na	na	na	0.934	0.53	na
STC6467	7/11/90	0.02	na	2.1	<0.001	na	na	na	0.19	<0.001	na
MUN		*0.01*	*1*	*5*	*0.05*	*1.3*	*0.3*	*0.015*	--	*0.05*	*5*
AGR-Irrigation		*0.1*	--	*15*	*0.1*	*0.2*	*5*	*5*	*0.01*	*0.02*	*2*
AGR-Livestock		*0.2*	--	*5*	*1*	*0.5*	--	*0.1*	--	*0.05*	*24*
AGR-Poultry		*0.2*	--	*5*	*1*	*0.5*	--	*0.1*	--	*0.05*	*24*

Footnotes provided on next page

1. MUN - Municipal Supply, AGR - Agricultural Supply, µmhos/cm - micromhos per centimeter, mg/L - milligrams per liter, and meq/L - milliequivalents per liter, -- - not available or not applicable. Constituent concentration in mg/L milligrams per liter. TDS - total dissolved solids; Ca - calcium, Mg - magnesium, K - potassium, Na - sodium, Cl - chloride, CO_3 - carbonate, HCO_3 - bicarbonate, NO_2-N - nitrite nitrogen, NO_3-N - nitrate nitrogen, and SO4 - sulfate, EC - electrical conductance in µmhos/cm - micromhos per centimeter. Al - aluminum, Sb - antimony, As - arsenic, Ba - barium, Be - beryllium, B - boron, Cd - cadmium, Cr - chromium, Cu - copper, Fe - iron, Mo - molybdenum, Ni - nickel, Se - selenium, Si - silicon, Ag - silver, Tl - thallium, V - vanadium, and Zn - zinc, MUN - Municipal Supply, AGR - Agricultural Supply, -- - not available or not applicable.
2. Tile drain designation is by California well numbering system. Drain locations shown on Figure X.
3. MUN is MCL - maximum contaminant level or SCML - secondary maximum contaminant level. For Na - Sodium, the EPA Drinking Water Health Advisory (DWHA) of 20 mg/L was listed for MUN. AGR-Irrigation, AGR-Livestock and AGR-Poultry are from *Water Quality for Agriculture.* Concentrations at or greater than the MUN criterion (MCL/SMCL/DWHA) are highlighted.

TABLE 4

HISTORIC ANALYTICAL RESULTS FOR MINERAL/METAL CONSTITUENTS IN UNCONFINED/SEMI-CONFINED GROUNDWATER
Basin Plan Amendment Work Plan
Westside Water Quality Coalition

Well	Well Depth (feet)	Date	EC (umhos/cm)	TDS_{sum} (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	CO_3 (mg/L)	SO_4 (mg/L)	NO_3 (mg/L)	F (mg/L)	B (mg/L)	Hardness (mg/L)	pH (s.u.)
22S/17E-26E1	417	1/20/1954	2,200	1,720	147	90	3.7	232	58	86	0	994	123	0.3	0.43	737	7.6
22S/19E-19J1	487	1/6/1954	730	477	9.7	1.4	0.8	153	23	188	0	162	0.1	0.2	1.5	30	8.2
22S/19E-20N2	--	8/13/1951	783	480	12	8.0	--	170	45	304	0	94	--	--	1.0	63	8.0
22S/19E-20P1	--	8/13/1951	983	584	12	9.0	--	205	74	382	0	95	--	--	1.5	67	8.0
22S/19E-20Q1	--	8/12/1951	2,390	1,342	38	14	--	455	540	286	14	139	--	--	1.4	152	8.4
22S/19E-20Q2	--	8/13/1951	1,480	899	23	9	--	295	130	442	0	222	--	--	1.8	94	8.1
23S/18E-6D1	303	10/5/1955	2,140	1,504	145	88	3.6	241	52	90	0	930	--	--	0.48	722	7.7
23S/18E-29E2	364	2/16/1954	--	1,634	72.6	66.7	--	324.2	71	156	0	896	--	--	0.4	459	7.9
23S/18E-30A1	200	10/5/1955	1,620	1,089	49	38	2.0	259	45	121	0	636	--	--	1.5	278	7.7
23S/19E-11D1	360	1/6/1954	8,230	4,600	26	51	3.3	1,720	2,410	666	0	20	0.4	0.0	8.3	274	8.2
24S/17E-11P1	300	10/11/1955	1,980	1,330	69	67	6.4	284	99	265	0	672	--	--	2.6	448	7.7
24S/17E-25NE1/4	--	3/21/1950	1,920	1,255	82	69	--	251	170	281	0	543	--	--	2.08	490	--
24S/18E-11	--	5/20/1930	2,960	2,018	183	91	--	342	215	125	--	1,120	--	--	1.28	832	--
24S/18E-19NE1/4	--	12/1905	--	2,090	--	--	--	--	183	241	0	--	--	--	--	--	--
24S18E-30B1	540	3/21/1950	1,400	882	56	68	--	154	71	317	--	375	--	--	1.72	420	--
24S18E-30P1	--	3/21/1950	1,490	937	64	46	--	191	103	238	--	408	--	--	1.8	350	--
24S/18E-32D1	--	3/21/1950	1,520	944	70	68	--	154	103	244	--	427	--	--	1.52	455	--
24S/18E-33M2	--	9/15/1954	1,560	1,080	63	76	4.0	174	88	231	6	481	32	0.4	1.5	470	8.4
24S/18E-33N1	295	9/15/1954	1,480	1,010	63	64	4.2	182	108	214	9	407	36	0.4	1.2	419	8.3
24S/18E-33Q2	--	7/27/1955	1,600	1,140	73	82	4.0	176	84	274	0	514	26	0.2	1.6	520	8.0
24S/19E-2L1	704	5/12/1952	--	4,458.4	189.5	282.9	--	813.2	443	460	--	2,310	--	--	1.4	1,650	7.9
24S/19E-2Q1	--	5/12/1952	--	4,476.8	184.4	288.9	--	805.3	440	467	--	2,300	--	--	1.5	1,660	7.8
24S/19E-11G1	--	10/19/1955	6,470	4,971	201	215	10	1,160	900	244	0	2,360	--	--	4.9	1,380	7.7
24S/19E-12K1	--	5/12/1952	--	2,196.8	153.2	200.3	--	210.6	227	244	--	1,100	--	--	1.0	1,220	7.9
24S/18E-12Q1	--	5/12/1952	--	2,976	101.2	168.2	--	639.2	479	293	--	1,360	--	--	0.9	953	7.7
24S/18E-12N1	--	5/12/1952	--	3,340.8	55	57.1	--	1,124.7	1,550	320	--	359	--	--	1.1	375	7.8
25S/18E-2N1	--	8/13/1953	4,280	3,410	151	234	4.5	600	240	366	0	1,930	27	0.7	8.2	1,340	7.9
25S/18E-3D1	--	9/15/1954	1,550	1,090	61	79	4.6	178	88	236	0	507	15	0.1	1.5	475	8.2
25S/18E-3E1	303	7/27/1955	1,640	1,160	72	84	3.8	187	96	278	0	517	18	0.1	1.7	525	8.0
25S/18E-3M2	--	7/27/1955	1,980	1,410	131	90	9.2	187	150	266	0	639	17	0.2	1.6	696	7.6
25S/18E-3M3	352	8/13/1953	1,970	1,400	92	114	5.2	203	128	264	0	673	17	0.3	1.3	698	7.5
25S/18E-3N2	--	8/13/1953	6,400	4,900	425	459	9.6	522	1,200	218	0	2,120	12	0.4	2.3	2,950	7.7
25S/18E-5J2	--	4/29/1953	1,300	849	64	48	1.2	152	96	226	0	347	43	4.4	1.3	357	7.9
25S/18E-34R1	96	8/4/1954	876	565	98	7.2	2.9	79	102	129	5	164	22	0.2	0.3	274	8.4
25S/19E-6D1	--	5/4/1953	2,770	2,030	87	123	4.5	390	205	242	0	1,040	12	0.5	4.1	723	7.9
25S/19E-6D2	--	8/13/1953	3,100	2,270	106	136	12	418	260	254	0	1,140	12	0.4	1.8	824	7.7
25S/19E-6N1	1,432	9/15/1954	3,450	2,650	117	199	16	430	295	206	0	1,400	25	0.1	2.4	1,110	8.1
25S/19E-7M1	1,126	8/13/1955	5,210	4,170	149	265	10	800	435	464	0	2,190	10	0.5	5.7	1,460	7.6
25S/19E-7P1	--	8/13/1953	5,260	4,270	172	272	12	810	410	474	0	2,270	4.4	0.6	10	1,550	7.7
25S/19E-20Q1	501	4/20/1930	4,580	3,454	168	224	--	606	463	296	--	1,690	--	--	3.9	1,340	--
25S/19E-20Q2	400	8/4/1954	4,940	3,960	180	304	23	638	430	273	0	2,190	2.5	0.0	0.98	1,700	7.7
25S/19E-23B1	130	8/3/1954	3,360	2,470	138	131	7.0	484	3.11	201	0	1,240	20	0.2	2.5	884	8.2
25S/20E-15Q1	--	8/4/1955	3,890	3,010	303	91	3.0	528	402	124	0	1,570	1.4	0.4	5.1	1,130	7.9
25S/20E-35B1	--	5/25/1954	4,420	2,200	136	61	5.0	750	1,040	316	0	59	--	--	--	590	7.9

TABLE 4

HISTORIC ANALYTICAL RESULTS FOR MINERAL/METAL CONSTITUENTS IN UNCONFINED/SEMI-CONFINED GROUNDWATER

Basin Plan Amendment Work Plan

Westside Water Quality Coalition

Well	Well Depth (feet)	Date	EC (umhos/cm)	TDS_{sum} (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	CO_3 (mg/L)	SO_4 (mg/L)	NO_3 (mg/L)	F (mg/L)	B (mg/L)	Hardness (mg/L)	pH (s.u.)
25S/21E-32E1	--	8/5/1954	5,160	3,650	286	60	8.0	870	830	151	0	1,470	1.8	0.4	5.3	960	7.5
25S/21E-34Q1	--	8/4/1954	4,900	3,240	293	9.5	9.0	840	870	386	0	992	1.8	0.5	0.8	770	7.8
26S/17E-11R1	185	8/4/1954	1,800	1,250	67	72	1.6	241	126	249	0	552	24	0.9	0.95	464	8.0
26S/17E-13L2	--	10/13/1955	1,740	1,188	67	77	1.6	228	136	259	0	550	--	--	1.5	482	7.8
26S/18E-11K1	--	1/30/1953	8,370	5,450	378	220	5.7	1,250	2,200	236	0	1,180	70	0.5	11	1,850	7.4
26S/18E-14R1	--	8/5/1955	2,370	1,610	79	93	2.0	327	276	199	0	654	32	0.4	2.7	580	7.6
26S/18E-15P1	--	8/5/1955	2,180	1,530	82	97	1.5	280	232	195	0	666	26	0.6	2.0	604	7.7
26S/18E-16J1	--	8/5/1955	2,100	1,470	80	91	1.5	272	198	214	0	657	22	0.6	1.7	572	7.7
26S/18E-16M1	300	8/5/1955	2,020	1,400	74	81	3.0	264	170	233	0	633	15	1.0	1.7	518	7.7
26S/18E-16N1	290	8/4/1955	2,500	1,840	115	102	4.0	332	205	231	0	926	0.5	0.7	1.7	708	8.2
26S/18E-18F3	--	8/5/1955	1,790	1,270	64	73	2.5	241	128	254	0	575	14	1.0	1.5	460	7.5
26S/18E-19B2	--	8/5/1955	4,550	3,750	322	183	14	620	304	391	0	2,060	1.8	0.6	4.1	1,500	7.9
26S/18E-21A1	285	8/5/1955	2,720	2,000	114	127	3.2	352	220	218	0	1,010	23	0.5	2.1	805	7.8
26S/18E-22C1	300	8/5/1955	2,320	1,680	93	107	2.5	297	192	207	0	820	21	0.6	1.7	647	7.8
26S/18E-23A1	--	4/22/1953	2,290	1,560	87	95	2.8	286	240	210	0	675	27	0.6	1.4	608	7.9
26S/18E-23C1	286	8/5/1955	2,290	1,590	100	91	2.0	300	237	210	0	677	33	0.4	2.3	624	7.9
26S/18E-23M2	1,200	8/5/1955	2,480	1,800	105	113	3.0	319	208	220	0	874	23	0.6	1.8	728	7.7
26S/18E-27F1	--	8/5/1955	7,960	7,040	577	386	18	1,106	690	490	0	3,930	5.2	0.6	8.1	3,020	7.5
26S/19E-12L1	358	8/3/1954	4,730	3,660	363	188	6.0	544	629	147	0	1,790	12	0.0	2.7	1,680	8.0
26S/19E-25M1	363	4/20/1930	3,630	2,354	199	114	--	450	606	204	--	884	--	--	1.2	964	--
26S/21E-6F1	--	8/4/1955	7,960	6,600	528	234	4.0	1,330	1,000	97	0	3,470	1.6	0.4	10	2,280	7.4
26S/21E-12F1	--	2/2/1953	2,750	1,860	81	40	3.6	500	230	500	0	712	0.4	1.0	2.9	366	8.0
26S/21E-14F1	--	6/28/1948	3,600	2,700	230	43	5.3	620	500	580	0	920	0.9	--	--	751	--
26S/21E-14H2	300	8/4/1954	4,060	2,650	254	19	7.0	6.29	795	237	0	803	1.2	0.4	1.5	711	7.8
26S/21E-26G1	--	8/4/1954	6,320	4,280	418	31	16	1,040	1,460	143	0	1,200	8.9	0.2	5.5	1,170	7.9
26S/21E-28P1	130	8/9/1954	4,970	3,730	366	91	17	711	745	166	0	1,670	3.1	0.0	3.2	1,290	7.6
27S/19E-28H1	920	8/3/1955	7,570	6,130	416	184	12	1,360	980	206	0	3,020	4.4	1.4	9.1	1,800	7.5
27S/19E-28H2	--	8/6/1954	8,020	6,490	482	195	4.0	1,370	972	211	0	3,310	2.0	9.4	9.4	2,010	8.2
27S/20E-9C1	--	4/20/1930	5,450	3,863	282	166	--	779	766	186	--	1,780	--	--	3.31	1,390	--
27S/20E-34G1	460	2/9/1954	--	2,848	20.3	26.4	--	998.4	830	827	--	464	--	--	0.4	161	8.3
27S/21E-3A1	300	9/16/1930	6,100	5,041	487	88	--	1,025	542	85	--	2,850	--	--	5.23	1,580	--
27S/22E-6NW1/4	--	8/18/1944	890	537	22	13	--	177	57	445	--	48	--	--	0.92	110	--
28S/22E-7Q1	--	--	--	3,875	274	65	--	911	463	100	0	2,110	--	--	--	950	6.9
MCLs			*900-1,600*	*500-1,000*	--	--	--	*20*	*250-500*	--	--	*250-500*	*45*	*2.0*	*1.0*	--	--

1. MUN - Municipal Supply, µmhos/cm - micromhos per centimeter, mg/L - milligrams per liter, and meq/L - milliequivalents per liter, -- - not available or not applicable.
   Constituent concentration in mg/L milligrams per liter. TDS_{sum} - sum of cations + anions; Ca - calcium, Mg - magnesium, K - potassium, Na - sodium, Cl - chloride, CO_3 - carbonate, B - boron, HCO3 - bicarbonate, F - Fluoride, NO_3 - nitrate, and SO4 - sulfate, EC - electrical conductance in µmhos/cm - micromhos per centimeter, and pH in standard units.
2. Well designation is by California well numbering system. Well locations shown on Figure X.
3. MUN is MCL - maximum contaminant level or SCML - secondary maximum contaminant level. For B, the SWRCB Notification Level (NL) of 1 mg/L is listed. For Na, the EPA Drinking Water Health Advisory (DWHA) of 20 mg/L is listed. Constituents in excess of the corresponding MCL (or equivalent NL or DWHA) are shaded.

TABLE 5

RECENT UNCONFINED/SEMI-CONFINED GROUNDWATER ANALYTICAL RESULTS FOR MINERAL CONSTITUENTS[1]

Basin Plan Amendment Work Plan
Westside Water Quality Coalition

Well[2]		Sample Date	EC (µmhos/cm)	TDS (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)	Cl (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L)	NO_2-N (mg/L)	NO_3-N (mg/L)	SO_4 (mg/L)
Belridge 1	W-012	5/22/2013	21,000	18,000	1,300	460	14	3,600	7,800	<30	670	<10	<44	2,200
Belridge 1 (DUP)	W-013	5/22/2013	21,000	18,000	1,400	510	15	3,500	7,600	<30	620	<10	<44	2,100
Belridge 3	W-014	5/22/2013	9,600	6,800	390	90	6.9	1,700	3,100	<3	37	<5	<100	1,000
Belridge 6	W-001	5/21/2013	6,500	4,700	550	170	4.3	710	1,700	<3	120	<2.5	<11	1,100
Belridge 7	W-002	5/21/2013	3,700	2,700	310	100	2.4	400	790	<3	83	<1	<4.4	950
Belridge 9	W-004	5/21/2013	4,800	3,200	280	26	4.3	780	1,100	<3	92	<2.5	<11	860
Belridge 10	W-005	5/21/2013	6,800	5,000	640	79	5.7	850	1,900	<3	180	<2.5	<11	800
Belridge 11	W-006	5/21/2013	6,100	4,500	600	85	5.3	730	1,600	<3	160	<2.5	<11	880
Belridge 12	W-007	5/21/2013	3,600	2,200	210	17	3.8	510	870	<3	58	<1	<4.4	510
Belridge 13	W-008	5/21/2013	2,900	1,800	180	14	3.8	410	620	<3	58	<0.5	<2.2	510
Belridge 15	W-021	5/30/2013	6,200	3,900	340	48	5.6	1,100	1,300	<3	81	<2.5	<11	1,200
Belridge 16	W-003	5/21/2013	3,000	2,300	220	68	2.3	400	420	<3	87	<0.5	<2.2	1,100
Berrenda Mesa 1	W-009	5/21/2013	1,800	1,300	59	78	<2	220	200	<3	190	<2.5	16	450
Berrenda Mesa 2	W-015	5/22/2013	3,200	2,600	150	130	12	450	310	<3	220	<1	6	1,200
Berrenda Mesa 3	W-016	5/22/2013	2,400	1,800	89	99	3.3	340	220	<3	220	<0.5	6.5	830
Berrenda Mesa 4	W-017	5/22/2013	2,300	1,700	81	97	2.7	300	220	<3	200	<0.5	6.4	800
Berrenda Mesa 6	W-018	5/22/2013	2,700	2,100	170	80	3.2	360	280	<3	140	<0.5	<2.2	1,000
Dudley Ridge 1	W-020	5/22/2013	4,500	3,000	310	46	2.8	690	950	<3	87	<1	<4.4	1,200
Lost Hills 1	W-019	5/22/2013	3,100	2,500	220	96	2.8	410	340	<3	130	<1	<4.4	1,300
Lost Hills 3	W-010	5/21/2013	5,800	4,000	400	43	3.8	970	1,200	<3	310	<2.5	<11	1,300
Lost Hills 4	W-011	5/21/2013	5,100	3,200	330	32	2.9	770	1,400	<3	98	<2.5	<11	470
Lost Hills 5	W-022	5/30/2013	2,700	2,000	170	91	3.3	370	240	<3	160	<0.5	<2.2	1,000
MUN[3]			*1,600*	*1,000*	--	--	--	*20*	*500*	--	--	*1*	*10*	*500*
AGR-Irrigation			*3,000*	*2,000*	--	*500*	--	--	--	--	--	--	--	--
AGR-Livestock			*8,000*	*5,000*	--	*500*	--	--	--	--	--	*10*	*100*	*3,000*
AGR-Poultry			*5,000*	--	--	*400*	--	--	--	--	--	*10*	*100*	--

1. MUN - Municipal Supply, AGR - Agricultural Supply, µmhos/cm - micromhos per centimeter, mg/L - milligrams per liter, and meq/L - milliequivalents per liter, -- - not available or not applicable. Constituent concentration in mg/L milligrams per liter. TDS - total dissolved solids; Ca - calcium, Mg - magnesium, K - potassium, Na - sodium, Cl - chloride, CO_3 - carbonate, HCO_3 - bicarbonate, NO2-N - nitrite nitrogen, NO_3-N - nitrate nitrogen, and SO4 - sulfate, EC - electrical conductance in µmhos/cm - micromhos per centimeter.
2. Well designation is by California well numbering system. Well locations shown on Figure 4.
3. MUN is MCL - maximum contaminant level or SCML - secondary maximum contaminant level. For Na - Sodium, the EPA Drinking Water Health Advisory (DWHA) of 20 mg/L was listed for MUN. AGR-Irrigation, AGR-Livestock and AGR-Poultry are from *Water Quality for Agriculture*. Concentrations at or greater than the MUN criterion (MCL/SMCL/DWHA) are highlighted.

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TABLE 6

RECENT UNCONFINED/SEMI-CONFINED GROUNDWATER ANALYTICAL RESULTS FOR METAL CONSTITUENTS[1]

Basin Plan Amendment Work Plan
Westside Water Quality Coalition

Well[2]		Sample Date	Al (µg/L)	Sb (µg/L)	As (µg/L)	Ba (µg/L)	Be (µg/L)	B (µg/L)	Cd (µg/L)	Cr (µg/L)	Cu (µg/L)	Fe (µg/L)	Pb (µg/L)	Mn (µg/L)	Hg (µg/L)	Mo (µg/L)	Ni (µg/L)	Se (µg/L)	Si (µg/L)	Ag (µg/L)	Tl (µg/L)	V (µg/L)	Zn (µg/L)	Gross Alpha (pCi/L)
Belridge 1	W-012	5/22/2013	<50	<2	<4	36	<2	45,000	<1	<20	<50	<30	<5	1,100	0.42	<20	<20	210	43,000	<10	<1	<20	<50	479
Belridge 1 (DUP)	W-013	5/22/2013	<50	<2	<4	41	<2	47,000	<1	<20	<50	<30	<5	1,200	0.44	22	<20	250	46,000	<10	<1	<20	<50	447
Belridge 3	W-014	5/22/2013	<50	<2	<2	23	<1	32,000	<1	<10	<50	15,000	<5	4,100	<0.2	<10	<10	95	1,700	<10	<1	<10	<50	6.62
Belridge 6	W-001	5/21/2013	<50	<2	2	23	<1	17,000	<1	<10	<50	<30	<5	170	<0.2	69	69	55	3,300	<10	<1	<10	<50	25.9
Belridge 7	W-002	5/21/2013	<50	<2	3.1	16	<1	9,100	<1	<10	<50	<30	<5	160	<0.2	68	<10	20	3,400	<10	<1	29	<50	23.7
Belridge 9	W-004	5/21/2013	<50	<2	27	60	<1	6,500	<1	<10	<50	<30	<5	960	<0.2	78	<10	20	50,000	<10	<1	<10	<50	9.38
Belridge 10	W-005	5/21/2013	<50	<2	26	93	<1	10,000	<1	<10	<50	140	<5	2,000	<0.2	41	<10	40	54,000	<10	<1	<10	<50	17.7
Belridge 11	W-006	5/21/2013	<50	<2	28	96	<1	9,700	<1	<10	<50	<30	<5	1,900	<0.2	47	<10	37	59,000	<10	<1	<10	<50	12.7
Belridge 12	W-007	5/21/2013	<50	<2	32	52	<1	4,300	<1	<10	<50	<30	<5	510	<0.2	44	<10	16	51,000	<10	<1	<10	<50	4.42
Belridge 13	W-008	5/21/2013	<50	<2	33	45	<1	3,800	<1	<10	<50	<30	<5	480	<0.2	22	<10	13	51,000	<10	<1	<10	60	6.62
Belridge 15	W-021	5/30/2013	<50	<2	18	19	<1	3,300	<1	<10	<50	<30	<5	30	<0.2	61	<10	26	30,000	<10	<1	<10	<50	7.73
Belridge 16	W-003	5/21/2013	<50	<2	22	11	<1	6,700	<1	<10	<50	<30	<5	<10	<0.2	110	<10	10	45,000	<10	<1	21	<50	10.5
Berrenda Mesa 1	W-009	5/21/2013	<50	<2	<2	17	<1	1,600	<1	<10	<50	<30	<5	<10	<0.2	44	<10	28	39,000	<10	<1	<10	<50	2.76
Berrenda Mesa 2	W-015	5/22/2013	<50	<2	5.2	12	<1	2,800	<1	<10	<50	<30	<5	190	<0.2	69	<10	34	65,000	<10	<1	18	<50	29.3
Berrenda Mesa 3	W-016	5/22/2013	<50	<2	<2	13	<1	2,500	<1	<10	<50	<30	<5	19	<0.2	86	<10	45	49,000	<10	<1	<10	<50	11
Berrenda Mesa 4	W-017	5/22/2013	<50	<2	<2	12	<1	2,100	<1	<10	<50	<30	<5	13	<0.2	65	<10	38	47,000	<10	<1	<10	<50	12.1
Berrenda Mesa 6	W-018	5/22/2013	<50	<2	<2	11	<1	2,500	<1	<10	<50	<30	<5	470	<0.2	67	<10	12	44,000	<10	<1	<10	<50	12.1
Dudley Ridge 1	W-020	5/22/2013	<50	<2	14	37	<1	1,200	<1	<10	<50	<30	<5	41	<0.2	30	<10	15	28,000	<10	<1	<10	<50	<3
Lost Hills 1	W-019	5/22/2013	<50	<2	<2	8.3	<1	3,000	<1	<10	<50	48	<5	15	<0.2	79	<10	21	38,000	<10	<1	<10	<50	7.73
Lost Hills 3	W-010	5/21/2013	<50	<2	6	23	<1	3,300	<1	<10	51	<30	<5	3,100	<0.2	84	<10	22	24,000	<10	<1	<10	<50	12.1
Lost Hills 4	W-011	5/21/2013	<50	<2	10	34	<1	800	<1	<10	<50	<30	<5	1,100	<0.2	19	<10	29	23,000	<10	<1	<10	<50	22.6
Lost Hills 5	W-022	5/30/2013	<50	<2	<2	13	<1	2,600	<1	<10	<50	<30	<5	46	<0.2	80	<10	8.6	46,000	<10	<1	<10	<50	11
MUN[3]			*1,000*	*6*	*10*	*1,000*	*4*	*5,000*	*5*	*50*	*1,300*	*300*	*15*	*50*	*2*	*--*	*100*	*50*	*--*	*100*	*2*	*--*	*5,000*	*15*
AGR-Irrigation			*5,000*	*--*	*100*	*--*	*100*	*15,000*	*10*	*100*	*200*	*5,000*	*5,000*	*200*	*--*	*10*	*200*	*20*	*--*	*--*	*--*	*100*	*2,000*	*--*
AGR-Livestock			*5,000*	*--*	*200*	*--*	*100*	*5,000*	*50*	*1,000*	*500*	*--*	*100*	*50*	*10*	*--*	*--*	*50*	*--*	*--*	*--*	*100*	*24,000*	*--*
AGR-Poultry			*5,000*	*--*	*200*	*--*	*100*	*5,000*	*50*	*1,000*	*500*	*--*	*100*	*50*	*10*	*--*	*--*	*50*	*--*	*--*	*--*	*100*	*24,000*	*--*

1. Metals concentration in micrograms per liter: Al - aluminum, Sb - antimony, As - arsenic, Ba - barium, Be - beryllium, B - boron, Cd - cadmium, Cr - chromium, Cu - copper, Fe - iron, Pb - lead, Mn - manganese, Hg - mercury, Mo - molybdenum, Ni - nickel, Se - selenium, Si - silicon, Ag - silver, Tl - thallium, V - vanadium, and Zn - zinc, MUN - Municipal Supply, AGR - Agricultural Supply, -- - not available or not applicable
2. Well designation is by California well numbering system. Well locations shown on Figure 4.
3. MUN is maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL). under MUN. For Al, the MCL has been listed rather than the SMCL (200 micrograms per liter (µg/L), under MUN. For Al, the MCL has been listed rather than the SMCL (200 µg/L), under MUN. AGR-Irrigation, AGR-Livestock and AGR-Poultry are from Water Quality for Agriculture. Concentrations at or greater than the MUN criterion (MCL/SMCL/DWHA) are highlighted.

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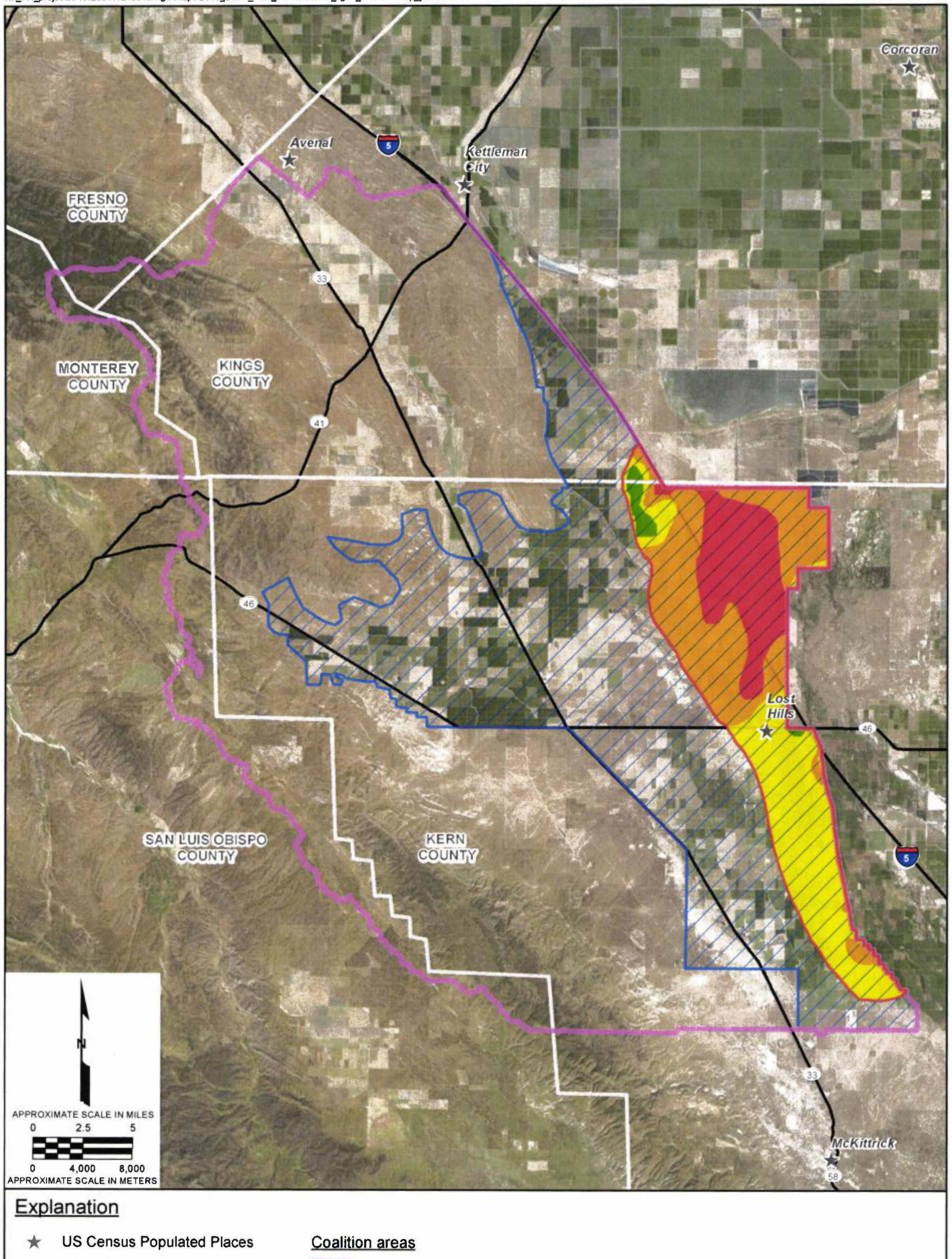

Explanation

★ US Census Populated Places

Counties

Electrical conductivity in perched groundwater 2012 (µmhos/cm)

- 0 - 2,000
- 2,000 - 4,000
- 4,000 - 10,000
- 10,000 - 20,000
- > 20,000

Coalition areas

- Westside Water Quality Coalition
- Basin Plan Amendment Area Unconfined/Semi-Confined
- Basin Plan Amendment Area Perched Groundwater

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

WESTSIDE WATER QUALITY COALITION MAP AND BASIN PLAN AMENDMENT AREAS Westside Water Quality Coalition Kern and Kings Counties, California		amec foster wheeler
Date: 08/17/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	1

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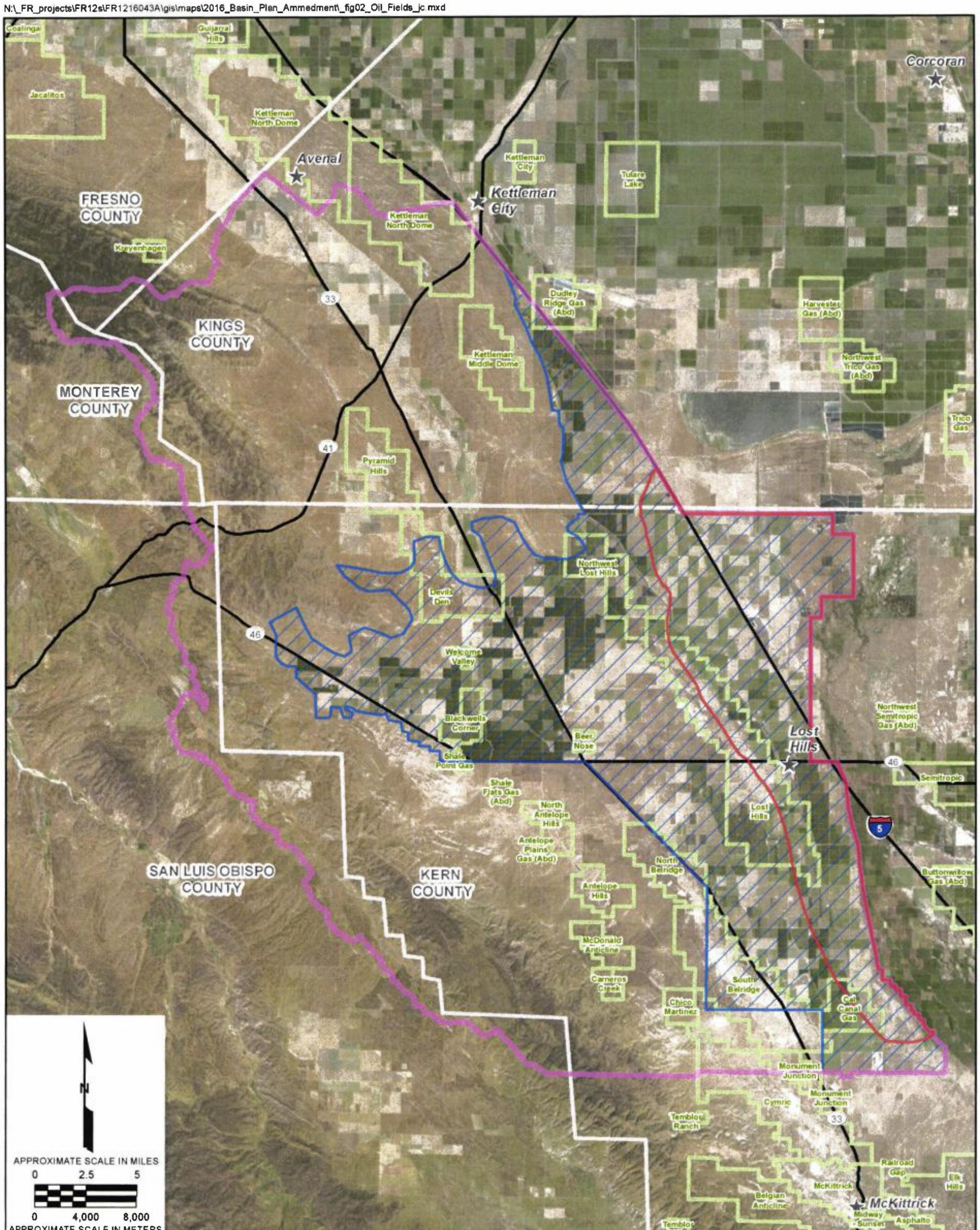

Explanation

★ US Census Populated Places

Counties

Oil field administrative boundaries

Coalition areas

Westside Water Quality Coalition Jurisdiction

Basin Plan Amendment Area Unconfined/Semi-Confined

Basin Plan Amendment Area Perched Groundwater

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

OIL FIELDS WITHIN BASIN PLAN AMENDMENT AREAS Westside Water Quality Coalition Kern and Kings Counties, California		amec foster wheeler
Date: 08/17/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	2

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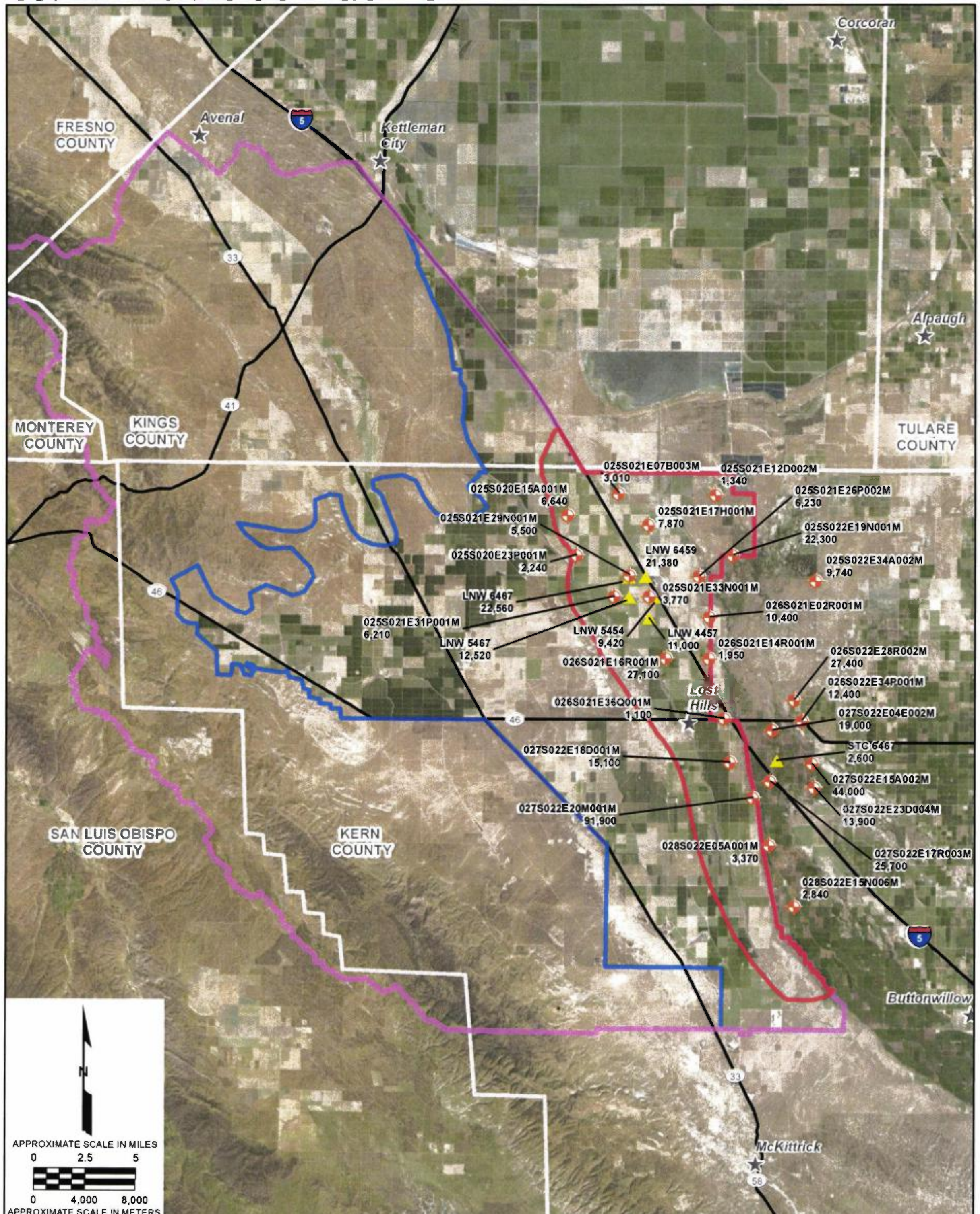

Explanation

- Monitoring well
- Tile drain
- US Census Populated Places
- Counties

Coalition areas

- Westside Water Quality Coalition
- Basin Plan Amendment Area Unconfined/Semi-Confined
- Basin Plan Amendment Area Perched Groundwater

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

SALINITY OF PERCHED GROUNDWATER AREA Westside Water Quality Coalition Kern and Kings Counties, California		amec foster wheeler
Date: 08/16/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	3

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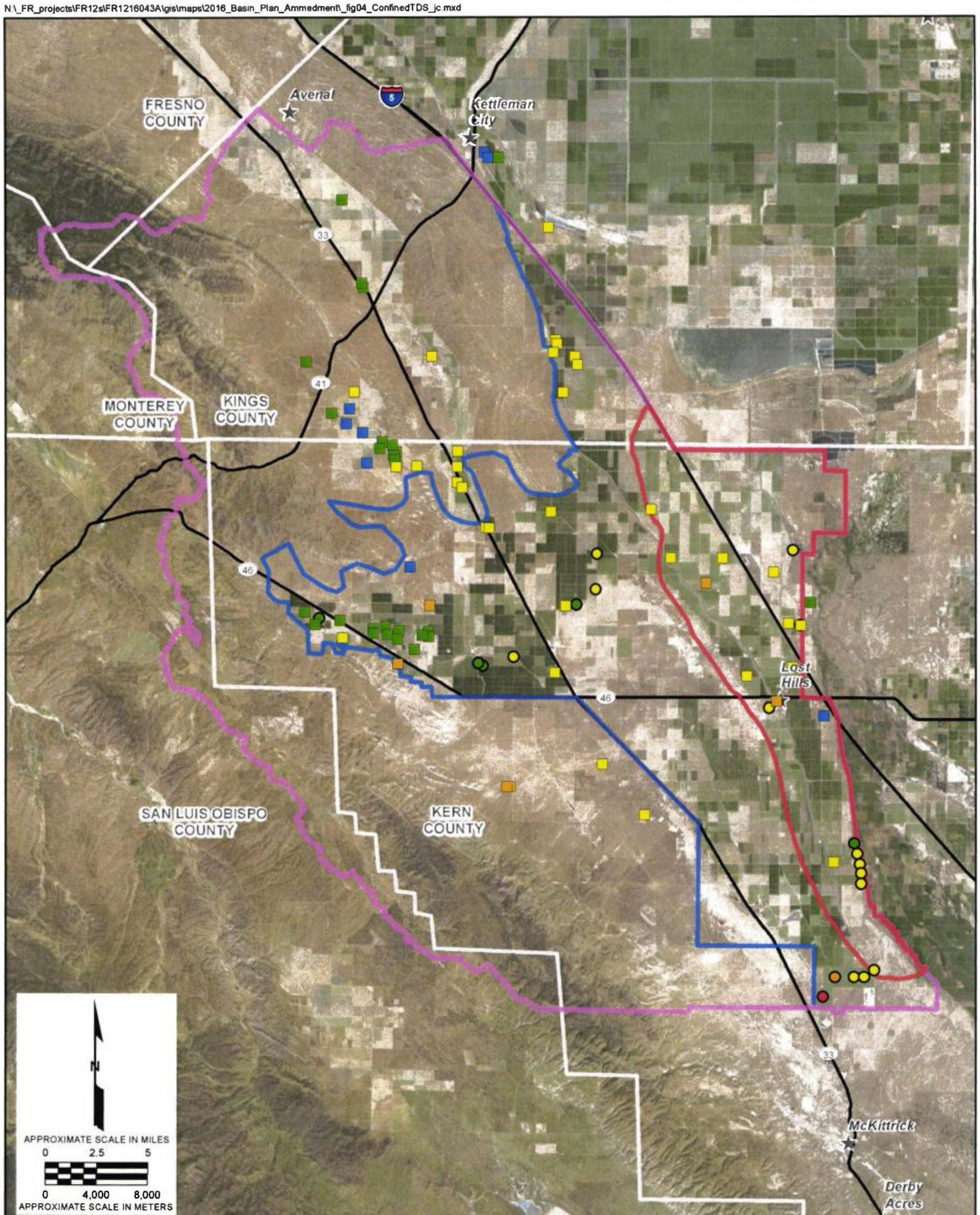

Explanation

★ US Census Populated Places

Counties

Coalition areas

Westside Water Quality Coalition Jurisdiction

Basin Plan Amendment Area Unconfined/Semi-Confined

Basin Plan Amendment Area Perched Groundwater

Historic analytical results (Table 4)

Recent analytical results (Table 5)

Total Dissolved Solids (milligram/Liter)

- 0 to 1,000 milligram per liter (mg/L) = MUN, AGR-Irrigation, AGR-Poultry, and AGR-Livestock
- 1,000 to 2,000 mg/L =AGR-Irrigation, AGR-Poultry, and AGR-Livestock
- 2,000 to 5,000 mg/L = AGR-Livestock
- >5,000 mg/L = no MUN, AGR-Irrigation, or AGR-Livestock beneficial use.
- >10,000 mg/L

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

TOTAL DISSOLVED SOLIDS OF UNCONFINED/SEMI-CONFINED GROUNDWATER
Westside Water Quality Coalition
Kern and Kings Counties, California

amec foster wheeler

Date: 09/10/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	4

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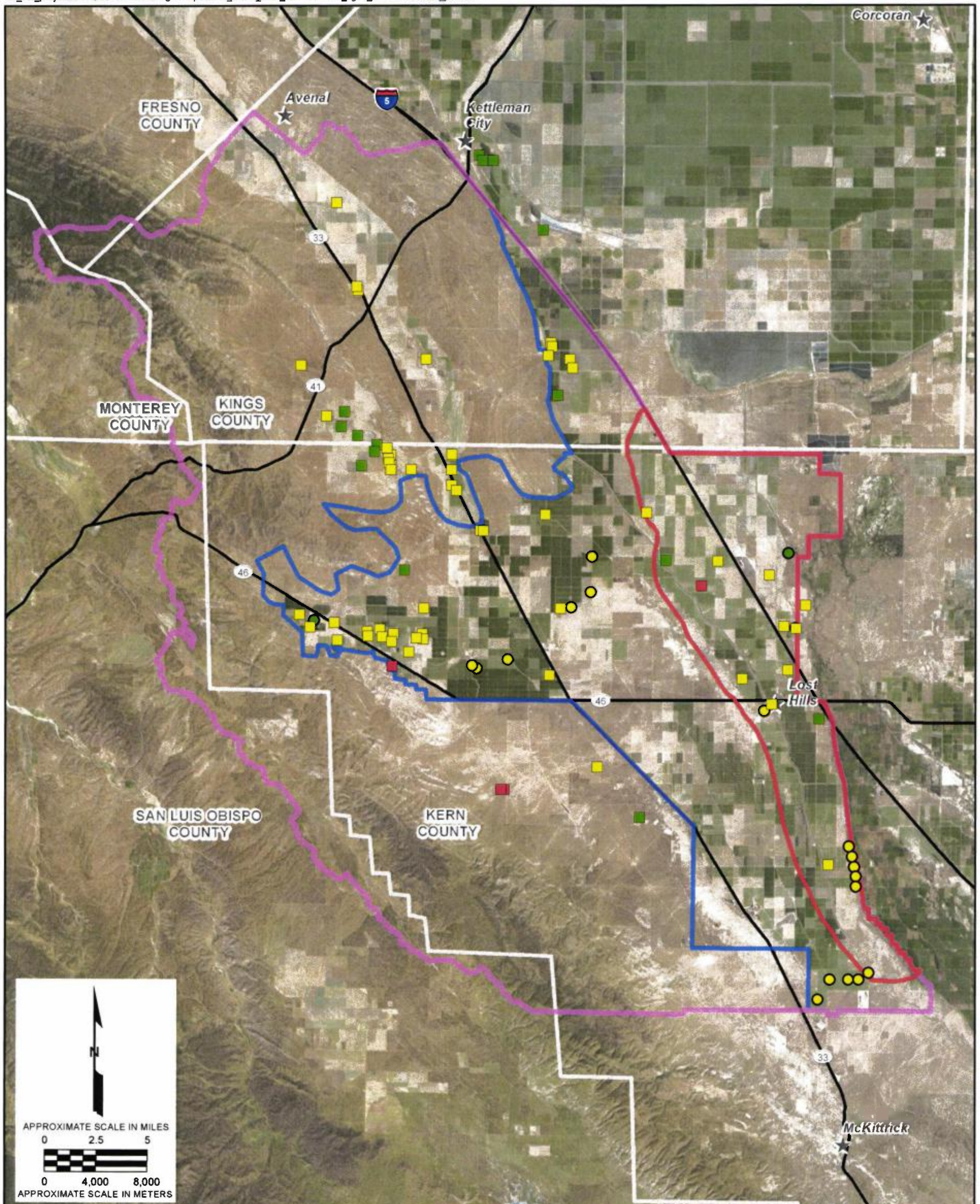


Explanation

★ US Census Populated Places

Counties

Coalition areas

Westside Water Quality Coalition Jurisdiction

Basin Plan Amendment Area Unconfined/Semi-Confined

Basin Plan Amendment Area Perched Groundwater

Historic analytical results (Table 4)

Recent analytical results (Table 5)

Sulfate Data (milligram/Liter)

0 to 500 milligram per liter (mg/L) = MUN, and AGR-Livestock

500.0 to 3,000 mg/L = AGR-Livestock

>3,000 mg/L = no MUN or AGR -Livestock beneficial use

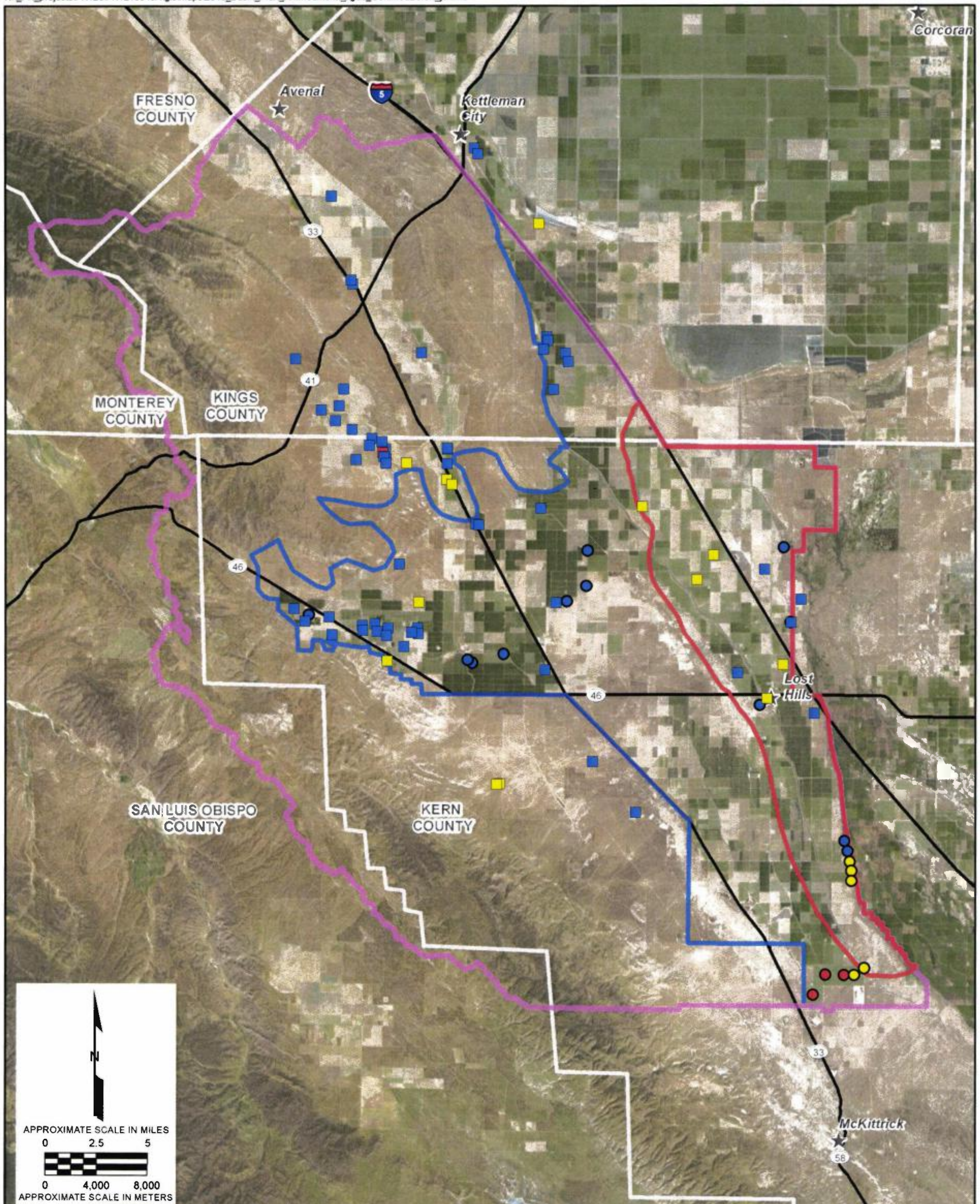
Basemap modified from ESRI online shared content, aerial imagery web mapping services.

SULFATE OF UNCONFINED/SEMI-CONFINED GROUNDWATER
Westside Water Quality Coalition
Kern and Kings Counties, California

amec foster wheeler

Date: 09/10/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	5

N:_FR_projects\FR12s\FR1216043A\gis\maps\2016_Basin_Plan_Ammedment_fig06_ConfinedBoron_jc.mxd



Explanation

★ US Census Populated Places

Counties

Coalition areas

Westside Water Quality Coalition Jurisdiction

Basin Plan Amendment Area Unconfined/Semi-Confined

Basin Plan Amendment Area Perched Groundwater

Historic analytical results (Table 4)

Recent analytical results (Table 6)

Boron Data (milligram/Liter)

0 to 5 milligram per liter (mg/L) = MUN, AGR-Irrigation, AGR-Livestock, and AGR-Poultry

5.01 to 15 mg/L = AGR-Irrigation

> 15 mg/L = no MUN, AGR-Irrigation, AGR-Livestock, or AGR-Poultry beneficial use

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

BORON OF UNCONFINED/SEMI-CONFINED GROUNDWATER
Westside Water Quality Coalition
Kern and Kings Counties, California

amec foster wheeler

Date: 09/10/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	6

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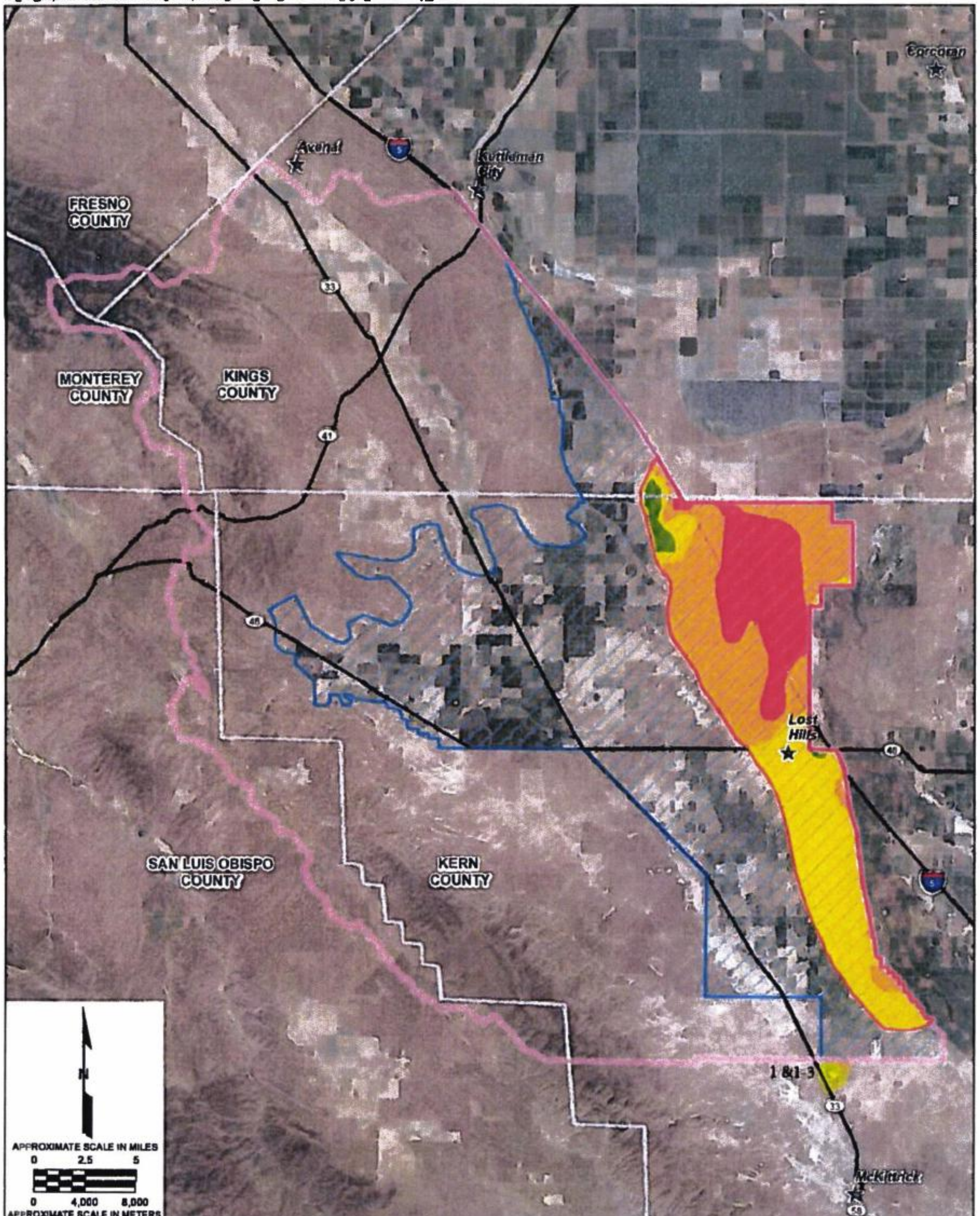

Explanation

- ★ US Census Populated Places
- Counties

Electrical conductivity in perched groundwater 2012 (μmhos/cm)

- 0 - 2,000
- 2,000 - 4,000
- 4,000 - 10,000
- 10,000 - 20,000
- > 20,000

Coalition areas

- Westside Water Quality Coalition
- Basin Plan Amendment Area Unconfined/Semi-Confined
- Basin Plan Amendment Area Perched Groundwater

Basemap modified from ESRI online shared content, aerial imagery web mapping services.

WESTSIDE WATER QUALITY COALITION MAP AND BASIN PLAN AMENDMENT AREAS Westside Water Quality Coalition Kern and Kings Counties, California		amec foster wheeler
Date: 08/17/2016	Project No.: FR1216043A	Figure
Submitted By: GLK	Drawn By: JAC	1